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THE AMERICAN GAS LIGHT JOURNAL

REDMAN&KENNY,N.Y.

PUBLISHING OFFICE No. 42 PINE STREET

DEVOTED TO THE INTERESTS OF ILLUMINATION, VENTILATION, WATER SUPPLY AND DISTRIBUTION, & GENERAL SCIENCE.

VOLUME LIII.—No. 20. Whole No. 806. | NEW YORK, MONDAY, NOVEMBER 17, 1890. | $3 PER ANNUM, IN ADVANCE.

A. M. CALLENDER & CO., Proprietors. C. E. SANDERSON, Manager.
JOS. R. THOMAS, C.E., Editor. T. J. CUNNINGHAM, Asst. Editor.

ENTERED AT THE POST OFFICE AT NEW YORK, N. Y. AS SECOND CLASS MATTER.

Published on each Monday of the year, at No. 42 Pine Street, N.Y.

Terms of Subscription, Including Postage.—For the United States and Canada, $3 per annum. European countries, $4.50 (19 shillings—22½ francs). All payments to be made in advance. Single copies, 10 cents.

Remittances should be made either by post-office order, express money order, registered letter, or bank draft on New York, payable to the order of A. M. Callender & Co.

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BRIEFLY TOLD.

THE EGNER AND PRATT PAPERS.—In our current instalment of the proceedings of the American Association we give two very interesting papers, that are well calculated to hold the attention of our readers. Of course, and at the very outset, those who read the JOURNAL need not be told that Mr. Egner can always be counted on to present matter that is not only instructive and entertaining, but that is also put together in good shape. In this instance his subject (that of "Inclined Retorts") cannot be said to present a field which would be especially attractive to a romancist, since there is so little of other than hard facts to deal with, yet Mr. Egner has managed with his usual skill to put together a very pretty story. Take it all in all, we fear that he did not reveal all the trials and disappointments that were met with in making the inclined installation at Station A of the Laclede Gas Light Company, and it is perhaps as well that the full recital was not made, for fear the history would have deterred some less courageous brother from attempting the plan. However, since all's well that ends well, and as the "end" at St. Louis has been more than a partial success, we are satisfied that Mr. Egner feels himself amply repaid for the time and labor expended in opposing the earlier sea of troubles that enveloped him. However, even the most sanguine believer in the inclined principle, or the most persistent advocate of the system, will not hold up Mr. Egner's paper at Savannah as an unreserved endorsement of the same. In fact Mr. Greenough's contribution to the very interesting discussion that followed the reading of the paper seemed quite appropriate, particularly in respect to the labor economy involved as between the use of charging machines and the employment of the inclined plan. To us it would seem that the time for the "throwing up of our hats" in acclaiming the Coze redivivus as the solver of the labor question in our retort houses, is not yet at hand, although beyond a doubt it is in the line of advance, and sharp advance. Mr. Egner's paper is clear, practical and straightforward.

THE member from Des Moines, Ia., saw fit to talk in set phrase on the "Extension of the Uses of Gas for Purposes Other than Illumination," and it seems to us that he talked wisely and well. In the first place, Mr. Pratt possessed the "advantages of an early New England training," and thus the habits and practice acquired at North Attleboro, Mass., were easily put in force in his new field in the far West. His paper is a blunt and understandable history of how success was achieved in a district that did not take kindly at first to gas for purposes other than lighting, but which has been won over from its error by teachers who slighted not their duty. Mr. Pratt and his Company, by the way, seem not to be satisfied at letting well enough alone; for in our current items will be found a notification to the effect that the Capital City gas consumers are to get their gas for lighting, cooking and heating at still lower figures than ever. Precept followed by practice of that class ought surely "bring them over," and it is at once reassuring and satisfactory to know that once "brought over" they are not likely "to backslide." Mr. Pratt well deserved the vote of thanks that the Association awarded him, although we believe that neither the gas engine builders nor the gas stove manufacturers have much to be thankful for in the scoring that was dealt out to them by some of those who took part in the discussion.

Perhaps the prices of these wares are too high—gas engines always did seem on the dear side—but we would put in a plea for the gas stove makers, who certainly have no greater margin of profit, in this section of the country at least, on the average, than 15 per cent. Mr. Pratt and his paper certainly aroused the members, if the liveliness of the discussion is to be taken as a basis for that belief.

Death of Nathaniel Tufts.—It is with sincere regret that we chronicle the death of Mr. Nathaniel Tufts, whose connection with the gas industry, as a manufacturer of gas meters, made him well known to it. Deceased died at his home in St. James avenue, Boston, Mass., on the evening of Sunday, November 9, and from the shock occasioned by a fall experienced by him perhaps an hour before his death. Deceased was about 60 years of age, and was the originator of the firm of Tufts Brothers, which business he subsequently carried on under his own name. We hope in due time to give some history of his life, the particulars about which that we now have in hand being very meager.

A Lighting Test at Warren, Ohio.—Some time ago the authorities at Warren, Ohio, determined that Warren shohld be lighted, as to its streets, by means of arc lights, which was a very praiseworthy determination. Well, in proper time the arcs were strung, and in further time the contractors claimed their pay. Some of the citizens maintained that the light yielded by the arcs was not up to the standard called for in the contract, hence it was determined in Council that an expert should be employed to settle the matter definitely. The expert agreed upon was Prof. Thomas, of Columbus, who was instructed to examine and report upon the quality of the light that the Westinghouse system was developing in Warren, and the Professor, in company with Mayor Smith, Councilmen Clapp, Bubb and Hunt, electricians Smith and Winsor, of the Westinghouse Company, and some others, took carriages one fine night and drove over the city, stopping here and there to squint at the arc lights. Actually this is the way that Prof. Thomas measured the illuminating value of the arcs. He stood in the carriage near the arc, shaded his eyes with his hands, and reported as the carriage was being driven on to the next "testing station" that the lights were fully as good as those in Columbus. Our informant of this novel "test," in concluding his recital of the affair, naively says: "Prof. Thomas is expected to make some sort of report to Council when he renders his bill for services. No actual test of the quantity or quality of light furnished was made by instruments, as the Council intended, and a number of members are quite dissatisfied with the way the examination was made. At least two if not three members of the Board will now insist that such a test be made." And we would say it looks as though they had excellent reasons for their dissatisfaction.

Notes.—Mr. E. H. Yorke, Supt. of the Brockton (Mass.) works, on the occasion of his last birthday, was surprised by the presentation to him by the workmen of a very handsome meerschaum pipe and well-filled tobacco pouch. Bookkeeper E. B. Mooney made the presentation speech.——Messrs. W. A. Stedman, J. F. Addicks and F. C. Sherman, were the Engineers who appraised the old works of the Willimantic (Conn.) Gas Light Company, prior to the purchase of the same by the projectors of the new Citizens Gas Light Company. Mr. Edward Evans, of Lynn, Mass., will oversee the plant changes that are to be made forthwith.——The Attorney-General of Massachusetts listened, on Saturday, Nov. 8th, to argument on the petition of the Boston Electric Light Company, which asks him to file an information on the relation of the Board of Gas Commissioners to dissolve the Suburban Electric Light Company, or to oust it from exercising any rights under its franchise, the same having, as alleged, been sold to the Brookline Gas Light Company. The claim of the Suburban Company is that only a part of the franchise and property was sold to the Brookline Company, and that enough right was retained to make legal the reorganization of the Company which is now doing business. No decision was announced.

The Market for Gas Securities.

Confusion in Wall street and a market almost up to a panic smashed values right and left, but gas shares held their own fairly well. Consolidated sold down to 93½, but recovered sharply. The net result for the week is a net decline of 2½ points in the bid price, sales to-day (Friday) having been made at 96½, as against the 99 bid of a week ago. With anything like an easy money market, par and over ought to be made before the end of the next seven days. Chicago gas is at 37½, and it is a very cheap security at the figure. The range in Laclede was 15 to 12, with last sales at 14. Consolidated, of Baltimore, is off, although there is fair inquiry for it at 48½. Brooklyn shares are strong, save Citizens, which also suffered during the slump on Change.

[Continued from page 656.]

[Official Report—Revised by the Secretary.]

EIGHTEENTH ANNUAL MEETING OF THE AMERICAN GAS LIGHT ASSOCIATION.

Held at Savannah, Ga., October 15, 16 and 17, 1890.

First Day—Afternoon Session.

The Association met at 2 o'clock, and the President introduced Mr. Frederic Egner, of St. Louis, Mo., who read his paper on

INCLINED RETORTS.

Our subject is one to which the attention of gas makers has been frequently invited of late years, and when the Council of Administration of the American Gas Light Association honored me with an invitation to prepare a paper with the above title, to be read at the eighteenth annual meeting, these gentlemen probably were informed that the Laclede Gas Light Company had then in course of erection a stack of benches to be fitted with retorts in the inclined position, and was spending a large sum of money on apparatus which was at that time still regarded by many very much in the light of an experiment. The completion of these benches has been delayed beyond all reasonable limits, by the firm which had agreed to furnish the necessary iron work; so much so, indeed, that although it was expected that some of the benches would be under fire by the middle of last May, it was well in September before heating up could be commenced. Hence my experience with that kind of retort setting is not extensive; but the facts and figures gathered, and observations made, are herewith presented in the hope, on the part of the author, that you may find them interesting enough to compensate you for the time spent in listening to or reading them. We find "Inclined Retorts" spoken of in "King's Treatise on Coal Gas." In a paper read before the Western Gas Association, by Mr. Henry Pratt, May, 1888, and published by the gas journals of that day, we are given some historical, theoretical, and not a little practical information on the same subject, which was again brought before the same society by Mr R. D. Walsh, a year later. The *Scientific American* Supplement, of Nov. 28, 1885, contained an illustrated description of "Coze's System of Gas Retorts," giving a very fair representation of the system as developed at that date. Prior to this, viz., July 28, 1883, the *Scientific American* printed an article in which an inclined retort was shown in connection with a water gas generator, and quite recently profusely illustrated papers have been published in a number of technical journals, stating almost everything that can be said about inclined retorts, so that one can hardly escape the suspicion of plagiarism, however unfounded, when writing anything at all on that subject. I will, therefore, confine myself to simply describing to you the so called inclined benches which were erected at one, and give you the comparative results obtained from a bench in operation at another, of the works under my charge.

About two and one-half years ago, a bench with 5 inclined retorts was put in operation at the works of the St. Louis Gas Company. These works are now known as "Station A" of the Laclede Gas Light Company, of St. Louis. This bench is located by itself in a shed alongside of one of the retort houses, but is connected with the principal gas mains of said house by means of a 12-inch pipe. It is 10 feet 9 inches wide; 13 feet 5 inches long; and 16 feet 2 inches high. The retorts are "D's," 15 in. by 23 in. by 11 ft. 3 in., set at an angle of about 30°, and are heated by means of an ordinary retort bench furnace 14 inches wide and 5 feet deep.

The retorts were charged the first time on May 1, 1888, and were in continuous operation for a little over two years, when the bench was let down, the furnace relined, and one of the coal charging chutes, which needed it, repaired; then the bench was again fired up, charged, and is doing good work now, everything considered. At present we coke 9,400 pounds of Pittsburgh coal in that bench in 24 hours, using 24.06 pounds of the coke to each 100 pounds of coal carbonized, or about 40 per cent. of the coke made. The greatest amount of coal carbonized in 24 hours was 11,500 pounds, with the same proportion of coke used.

We have some benches of 5's (with horizontal retorts, of course) at another station. The retorts are 14 in. by 22 in. by 8 ft. 3 in. D's, with the same kind of furnace as that mentioned before, excepting that it is only 4 ft. 6 in. deep. In these benches we carbonize 7,950 pounds of coal per diem, using 23.94 pounds of coke to the 100 pounds of coal treated, or 38 per cent. of the coke made. In these benches we coke 99.37 pounds of coal per square foot of ground occupied, while in the inclined bench we carbonize at present only 70.07 pounds of coal per square foot. If, however, the latter bench was as favorably situated as

our ordinary benches are, there would perhaps be no difference between the two in that respect.

Comparing the first cost of our ordinary, and the inclined bench of 5's, we find that the inclined bench requires about 741 cubic feet more of solid brick work: about 1,000 pounds more of fireclay settings; 50 per cent. more labor to set the retorts and iron work, and 5,705 pounds more of iron material. Therefore, if any one of you would like to know approximately how much more an inclined retort bench would or ought to cost than a bench with horizontal retorts, you can get very close to it by adding what the above items would cost you to the price paid for the kind of bench you may now have. To this estimate there would have to be added the cost of the charging and coal hoisting apparatus; although Mr. Henry Pratt, whom I have quoted before, stated in his paper that he found that charging the retorts with a scoop shovel worked very well; and I think the same could be done with a wheelbarrow; hence, even in a small works where there would be only one or two benches, the inclined retort system *could be* used without the necessary machinery desirable in the operations of a larger works. Mr. Pratt's opinion, based on his experience with the system, was that it would not pay to use inclined retorts in any works requiring less than 200,000 cubic feet per diem. Mr. Gimper, Manager of the gas works at Leavenworth, Kansas, and Springfield, Mo., is now engaged in solving the above question for himself at the latter city; and as Mr. Gimper's friends know him to be a thorough gas man, both in theory and practice, it is not unlikely but that we shall soon get some valuable and reliable information on the subject of whether or not it pays to run only one bench of inclined retorts where only one or two benches are required. So far as works of the size of the Laclede are concerned, I can say that it would not pay to run only one such bench, if the men attending it could not be otherwise employed, which in our case they are. But the single bench has been valuable to us in a number of ways. We found without a doubt that a setting of inclined retorts would last as well as any other kind; that they could be scurfed, patched and heated as easily, and the charges as thoroughly and as quickly carbonized as the same in the common settings. And we found that with such settings the labor of drawing the coke and filling the retorts became such a simple and easy matter that anyone possessing the strength of a 16-year-old boy, and no more intelligence than a plantation darkey, could do the work after one showing, as well as the same could be done after years of practice in the ordinary way, by, our sometimes, a little unreasonable friend, the retort house fireman. He could not help but see that benches fitted with inclined retorts and heated by means of regenerative furnaces, would not only make a gas company about as independent of the retort house autocrat as a first-class water gas apparatus does; but that it would forever do away with the awfully hard labor required of men making gas in the old way, and must result in economy to the manufacturer besides, even though the first cost of the benches was much greater. And that is why we determined to erect a stack of eight benches of 7's on the inclined retort system.

Limited space at that time only prevented us from building more than the number stated. The benches just now about completed at the old Laclede gas works, were built in accordance with plans made by the late Alfred Arndt, Engineer of the Chicago Gas Light and Coke Company, modified, and we hope improved, in some particulars, by alterations suggested by Mr. McMillin and myself. I have brought with me a blue print of the original design (see Fig. I.), and a drawing (see Fig. II.) showing the changes made by us. The original design of the settings of these inclined retorts was furnished by Mr. A. Coze, of Rheims, France, and Mr. Arndt's work consisted in adapting his regenerative furnace to Coze's settings. We made some changes in the brick and iron work, as can be seen by comparing the blue print and drawing referred to; and although we made these after careful consideration, we have yet to demonstrate by practical operation the superiority of our theoretical improvements, but hope to be able in the near future to decide that question affirmatively.

Before proceeding with the description of our new benches, I desire to call your attention to a few facts in relation to this whole system of inclined retort setting. We all know that the idea of setting retorts "inclined" is not new. A retort set that way, with a mouthpiece at each end, is described in "King's Treatise on Coal Gas," as previously mentioned. Some manufacturers of retorts assure us that if we want such benches, we can have them without regard to Coze's patent. Coze, in his United States patent, numbered 388,953, and dated Sept. 4, 1887, makes the following claim:

"*First.* The inclined retorts, *A*, placed one above the other, combined with the charging mouths, *B*, whose open ends are all on the same level, whereby the retort may be charged from trucks on the same level, substantially as set forth. *Second.* The foregoing specification of my improvement in retorts for the distillation of coal and other solid matter, and in apparatus connected therewith, signed by me, this fourteenth day of May, 1887."

Now, a person need not be much of an expert in patent matters to know that the claim is weak, or of little practical value; and from all that has been said and written upon the subject, it must be plain to any one, not wilfully blind, that whoever cares to have inclined retorts can have them, without let or hindrance from the owners of the Coze or any other patent. But one thing no one should forget, and it is this: That although the idea itself is old, it is one that had been abandoned as useless; it had been forgotten and not considered worthy of a serious thought until Andre Coze took the matter in hand, and with the aid of genius, perseverance, and with the expenditure of much time and money, demonstrated to the world that the inclined retort was not the worthless thing it evidently was previously thought to be by everybody ex-

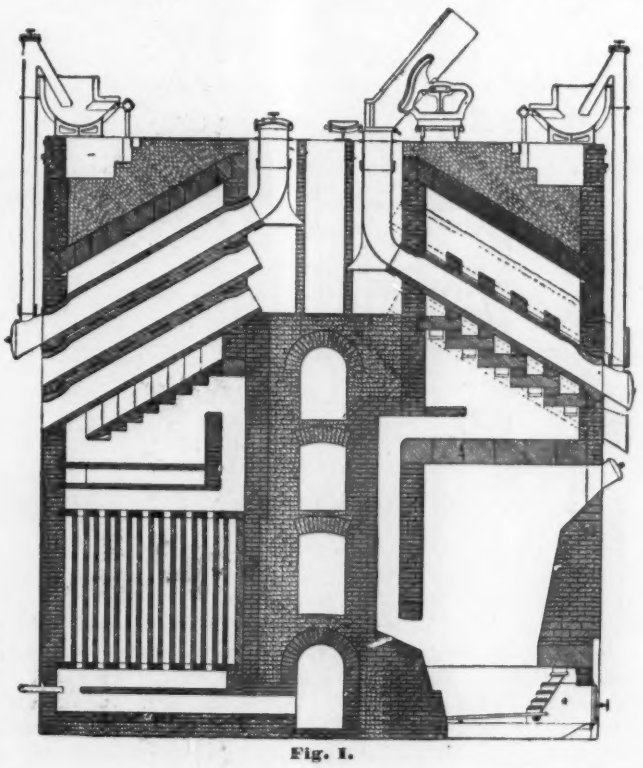

Fig. I.

cepting himself. *Then, after* he had published to the world the results of his successful experiment, the customary imitators appeared. However, it is probably safe to say, that but for Andre Coze the inclined retort would have been suffered to remain forgotten; and for that reason he should receive substantial reward by all who will use inclined retorts, whether they make use of "Coze's patent," or adopt some modification of the originally dead idea, revived to the benefit of the world by our respected fellow-worker in the gas profession in far-away France. It should be a point of honor with all who can make successful use of inclined retorts to give practical recognition to him who did more than the original inventor with the inclined retort.

I will now proceed with the description of *our new benches.* The addition to our retort house, in which they were erected, is of the same width and height as our old house. The stack of benches occupies a floor space of 27 feet by 50 feet, 5½ inches, exclusive of the chimney, which is at one end of the house. Less room is required between the wall and front of these benches than in the common setting, because the coal is delivered on top of the bench, and drawing the coke also requires less space than is required by the former. The distance from bottom of foundation to the floor line is 12 feet, 9½ inches, and from that point to top of bench is 16 feet, 11 inches. The arches are 9 feet, 8 inches wide inside, and 9 feet, 7½ inches long, from outside to outside, with a space of 7 feet, 9½ inches wide, and 8 feet, 10 inches high, between the rear ends of the retorts, thus forming a passage at the back of same, which is made continuous by means of arched doorways 18 inches wide, piercing the dividing walls between the benches. The space between the backs of the arches contains at its lowest point the main flue to the chimney, into which all the take-off flues of the benches enter. Above the flue, Arndt's design provided for three arched, hollow spaces, not communicating, which were merely built thus to save brick; but Mr.

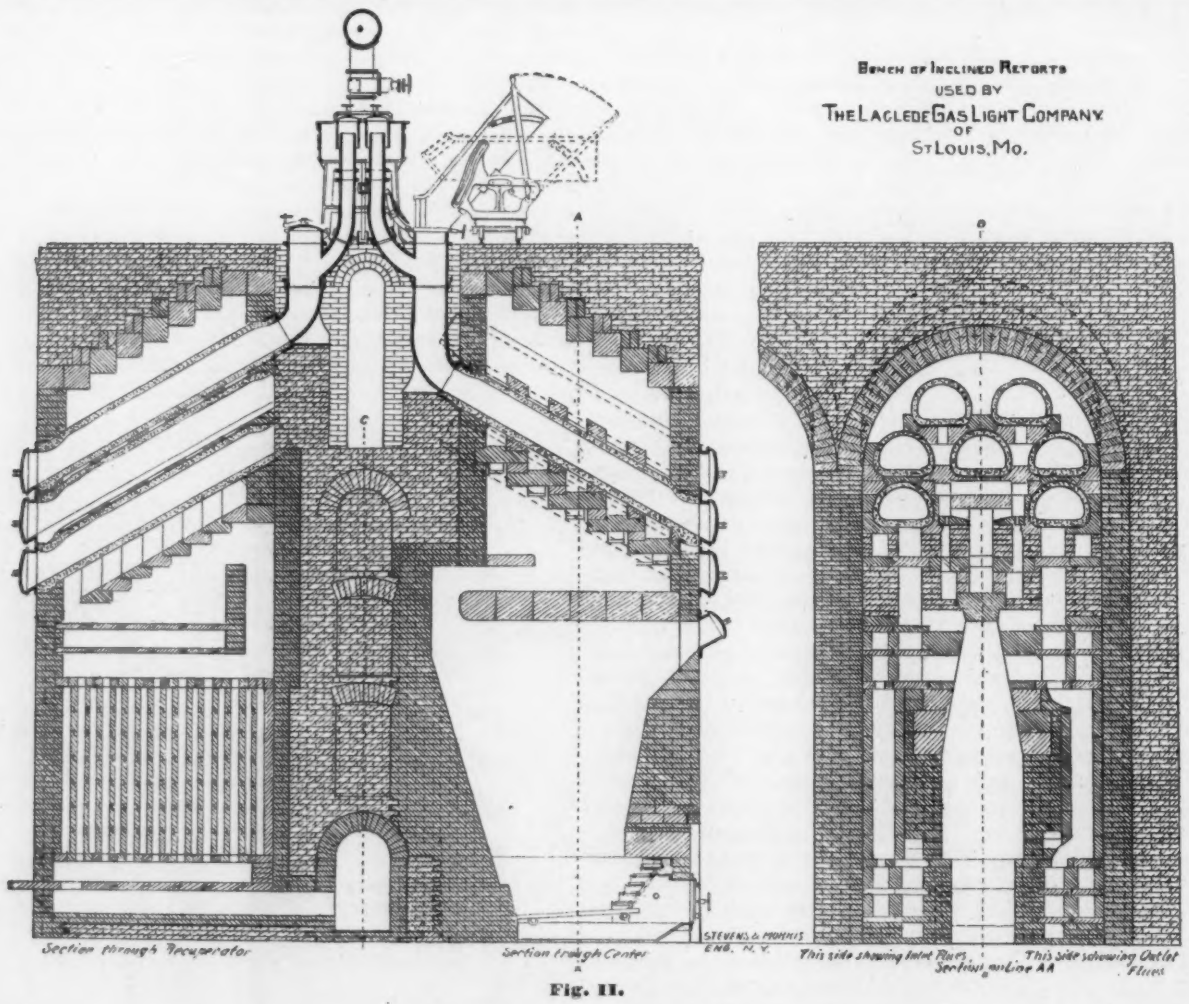

Fig. II.

McMillin thought these places would act as pockets, in which dangerous gases might accumulate, leading eventually to disastrous explosions, and advised to fill them up solid, which was done. The retorts, D's, are 16 inches by 22½ inches at the mouthpiece, 14 inches by 24 inches at the middle section, and 12 inches by 22 inches at the upper or charging end, and 10 feet, 10½ inches long from inside of lower to inside of upper mouthpiece. The arches are closed up around the retorts with 13½-inch walls, so that 8 feet 7 inches of its length is inside of the furnace. I hold that the effective floor surface of a "D" retort is that portion of it which is within the furnace walls, and that determines the gas making power of the same, if other conditions are equal. It is not the heating surface of the retort, as that is always bound to be great enough, compared with the area of the floor, of the style of retort mentioned.

Thus we find that the floor of our inclined retorts is equal to 18.7 square feet each, which is about the same as we could have if we rebuilt our old benches with horizontal "through" retorts. I fear I shall weary you if I go into greater detail with regard to these benches, and yet, if this paper is to be of any use, I ought to do it.

In order that you may readily be enabled to determine the possible benefits to be derived from the use of inclined retorts, the cost of their construction must be considered, comparatively with that of the horizontal retort.

Should we replace our common with regenerator furnaces, and instead of sixes, build benches of sevens, we would obtain the same gas making capacity, and require the same amount of substructure in such benches, as we have in our "inclines," that space of 7 feet, 9½ inches between the backs of the arches alone excepted. We would have room enough in our retort house as it is, and could employ stoking machinery for filling and drawing our retorts. As to what would be the best thing to do—to use stoking machines or inclined retorts—we can not say positively as yet. We know what can be done with the former, but not yet what saving can be effected by the latter system of operating a retort house on a large scale. The far greater simplicity of the inclined retort system is a strong argument in its favor, however, and the greater first cost of the benches is after all for items which do not wear out easily, and can be used with many subsequent settings.

The first column below shows the quantity of material which was actually required for each bench, including the chimney, and for convenience of comparison I have given in the second column the same information of what would have been needed, had benches with horizontal retorts of same size and like furnaces been built, instead of the "inclines," ; for very much of what may seem to be an excessive amount of material used, is due to the furnace, which would of course be the same for either style of setting.

	Inclined Retort Bench.	Horizontal Retort Bench.
Red brick	20,593.	7,500.
Building sand	6 cubic yards.	2 cubic yards.
Lime (80 pounds dry per bushel)	35 bushels.	12 bushels.
No. 1 fire brick	16,229.	12,000.
XXX No. 1 square brick.	575.	575.
Soap brick	650.	650.
Split brick	275.	275.
Arch brick & skew backs.	730.	730.
Various shaped blocks & tiles	81,146 lbs	74,896 lbs.
Dry milled clay	60 bbls.	48 bbls.
Ground brick	12 "	10 "
Retorts	7	7
All iron work complete	21,884 lbs.	13,325 lbs.
Labor to build (two men)	105 working days.	35 working days.

The coal to be used is elevated to the top of the stack and delivered into hoppers by means of a link-belt and bucket elevator.

From the hoppers the wagonettes are filled, and the latter are then rolled opposite the retorts to be charged, and the coal dumped. From the time the first lump of coal enters the retorts until the lid is closed usually takes eight seconds. To remove the coke takes longer ; but the labor is of such a nature that a man could do it with his coat and collar on, without inconvenience.

The coke dropping from the retorts is to be removed by a conveyer, operated by a steam or gas engine, to the coke store ; but as we expect to make other improvements at our works next spring, that matter has been postponed for the present. I had hoped to be able to state at this

meeting what results we obtained from these new benches; but as your Secretary informed me that he must have the paper by September 24th, I shall have to close without doing so; to which may be added that the benches may not after all be ready to charge at the date of this meeting. But we shall soon know what we can do, and by the third Wednesday of May, 1891, when the Western Gas Association will have its fourteenth annual meeting, at Louisville, Ky., a statement of results with the inclined bench, both at a large and small gas works may be looked for, and as the proceedings of that Association are published by the gas press, you will of course get that which I regret not to be able to give you now; and thus I leave the subject in your hands.

Having read the paper, Mr. Egner made the following additional remarks:

This paper was written about the 22d of September. Since then we have charged the benches. We would not have got them hot and charged them if it had not been for Mr. McMillin—for I was slow about it; but as he said to push them a little more, we pushed them to the point of working them. If I had this paper to write over again, I would probably make it shorter and more interesting; but as it is I have here a supplement which I wish to add to the paper, as follows:

Since the preceding paper was written the benches described were charged, and I can now give you some facts in connection with the practical working of the system on a larger scale than that with a single bench only. It is true, we have had only eight days of practical experience with our new benches with inclined retorts; but in writing about them I am reminded of the story about a little colored girl who, when asked how old she was, replied: "I's most leben years old; but if I reckon by the fun I's had, I's 'bout a hundred." We have had eight days of experience with these inclined retorts, but we have learned a good many things in those few days.

1st. We found that we can save about 35.3 per cent. in the number of men needed to handle an equal amount of coal (as compared with our old works) from beginning to end of the carbonizing operation.

2d. That, owing to the class of labor which can be employed, we can save 61.6 per cent. in money paid for wages as compared with the old system, and yet pay better wages by 12 per cent. at least than the same men could earn elsewhere.

3d. That there was an unmistakable prejudice among the men employed at the works against the new system, which prejudice did not stop there, but was given expression by a number of contemptible tricks played on the new apparatus and machinery connected therewith; and while the large majority of our men are honest, good, intelligent, and well-meaning, some one among them was a disgrace to the name of an honest working man—the latter the noblest creature on earth.

4th. That our retorts ought to have been set at a little greater angle, and that the curve of the coal chute at the upper and back end of the retorts should have been that of a parabola, and not that of a circle, as is the case with our coal chutes.

5th. That the coal chute castings should be carefully and very smoothly made. Any bumps in the casting are a detriment to the successful working of the retorts.

6th. That if we had made our retort house a few feet higher and wider, it would have been much more comfortable for the men employed, and might have resulted in a further saving of wages.

7th. That in all other respects we seemed to have hit upon a good practical construction of the original idea of Andre Coze.

A number of other little so-called "tricks of the trade" were learned during our short experience. As these are likely to occur to any gas worker, I will not further take up your time by relating them here, but will only add that if I had the experience of the past few days *before* writing the paper, I daresay I could have made it much shorter and more interesting.

Discussion.

Mr. Mooney—There is an error in Mr. Egner's paper, in the statement that Mr. Coze had revived a dead matter, as Mr. Cathels, a few years before his death, designed an inclined retort and a method for successfully charging and drawing the same. His first idea was to have a long chute for charging the retort, but after experiments at the gas works at Rockaway Beach, L. I., he adopted the plan of charging by means of a short chute and a double bucket—that is, a bucket within a bucket, the outer one emptying and the inner one following afterwards. The drawings were made by Mr. Arndt, and were obtained by me from Mr. Forstall a few weeks before his death.

The President—The drawings were made before the date of the patent?

Mr. Mooney—Yes, and were quite old drawings.

Mr. Littlehales—I can corroborate what Mr. Mooney has said, because the first experiments that Mr. Cathels made with reference to the angle of the chute were made in my own works. He was working on that for a long time, and it must have been at least three years before we heard anything of the Coze system that his drawings were completed. Hence what Mr. Egner says about their being free from any patent rights is perfectly clear.

Mr. Coggshall—I would like to ask the practical result of the eight days' work, in the amount of coal used, coke consumed, and gas produced.

Mr. Egner—We had arranged to run the gas through a separate meter, with an exhauster and a separate system of condensers, scrubbers, and purifiers. When the first six retorts were started our exhauster stopped short, and we could not turn it over. We had run that exhauster the day before, just to see that everything was clear. We opened the exhauster then and found within it handfuls of cotton waste and ravelings of manilla rope, and several handfuls of iron borings. In the meantime we conveyed the gas another way and started the benches. We could not run the gas made by the "inclines" through a separate meter, and for that reason cannot tell how much we made; but the coke comes out well carbonized. We have every reason to suppose that we got as much gas from the coal operated upon by the "inclines" as we would in the ordinary way, because the coal is thoroughly coked. The amount of coke that we use in the furnace is about 20 per cent. We charge 400 pounds of coal to a retort every four hours, and could charge more, because the furnace can be handled in any way you please. By opening the primary and secondary air drafts we could burn out the retort in a few hours. The coal we use will give 4.91 cubic feet of 17 candle power gas to the pound without an enricher.

Mr. Lansden—Will Mr. Egner give us his reasons for changing the Coze system, with regard to taking the gas from the back end of the retort instead of the front? Coze takes the gas from the front; but I see by Mr. Egner's drawings that he takes it from the same chute where the coal is charged, at the back end.

Mr. Egner—I do not know that I am at liberty to use Mr. McMillin's name in connection with this, but he was consulted, and we thought that thing over very carefully. We thought there would be an advantage in changing, having in mind the system of Davidson, who charged his retorts only half way from the back end, and claimed to get better results by doing so. Of course he had the front part of the retort as a superheater, and he did get more gas from a pound of coal than had been got before when charging retorts in the then customary manner. About 17 years ago I was sent by the President of the gas company that I was with then, to investigate that system. You all know that when we charge a retort we shove the coal back from the mouthpiece a little way, and you know why that is done. Now, with our inclined retorts, if we take the gas from the lower end, and as we know that much of the coal would run down there, we also know that any vapors coming from the coal at that point, which might be converted into gas by passing the heated surface of the retort if we take it off at the *upper end*, would go directly into the hydraulic main if we take off the gas at the lower end, and be deposited there only as very rich tar; and while we could get a good price for the tar, we are not in the tar business, and would rather make gas of it. We thought we would obtain better results per pound of coal by using only about two-thirds of a charge, filling the retorts only part way up, using the upper part of the retort as a superheater or fixer, so to speak; and that is the reason we put the outlet pipe at the upper end.

Mr. Lansden—I would like to ask Mr. Egner whether he found, in passing the tar up that way, that the condensation took place in the charging neck, the same as it would in a stopped stand-pipe? Would it not have interfered with the flow of the coal freely running down into the retort? I am interested in this matter because I am putting some in myself. This is a new departure, and I want to get all the information that I can.

Mr. Egner—We found no difficulty except from the fact that the chutes were made with a wrong curve, and the coal would drop down into them and lay there. These chutes, for a short distance, have the same angle of inclination as the retort itself, and in charging, the coal would sometimes fill the neck of the chute and lodge there. We overcame that difficulty by taking a sheet of No. 16 iron, and before charging the coal we run that sheet iron down into the back of the mouthpiece, and then dump our coal down between. Any one building an inclined retort bench should not forget to make a steeper curve on the mouthpiece than I have. Another thing to be remembered: In our bench of sevens we have a double curve at the two lower retorts, and that is not a good thing. The coal chute castings should be watched very carefully in the making, so as not to have them rough, and not to make them at all flat, anywhere; because if you do, the coal will lodge

there. We had no difficulty or trouble in charging after using that piece of sheet iron; but when we first started we got some of the bottom chutes stopped up, and when we dumped the coal in, the coal laid there and would not slide into the retort, and filled the chute right up to the top. But that was not on account of the tar. That happened the very first charge that we put in. Necessity being the mother of invention, we got this sheet iron, and it worked very nicely. There is no patent on that, and nobody can get one on it now, as it is free to the world.

Mr. Lansden—Mr. Egner speaks of the addition which he has made to the system of charging. I wish to say that an English patent which gives that same short chute, which is attached outside (and it would perhaps have the same effect) was brought to my attention in New York by a gentleman who had the patent for sale. It was a plan to do away with that abrupt angle. I do not know whether Mr. Egner has seen it or not. It is patented in England, and they are undertaking to introduce it here.

The President—That is entirely different from the Coze.

Mr. Egner—In reply to that I will say, I have seen the English patent, and that it was got out by Mr. Trewby, who, as I understood, put the sheet iron into the retort, and charged under it, so as to make the coal lie at any depth he chose to have it lie. He was charging under that sheet, withdrawing it after the charge was deposited in the retort. That is my impression of it, though I may be mistaken.

Mr. Norris—I would like to ask Mr. Egner the object of contracting the lower ends of this retort. I notice there is a decided depression there.

Mr. Egner—I think that was a very foolish thing to do. We had nothing to do with that. Those were plans furnished to us; and I would not advise anyone to do that, but in building inclined benches to avoid this contraction. It ought not to be there.

Mr. Norris—How is the coal stopped when it comes down? Does the coal come clear down to the lower part, or do you put in some arrangement to stop it within the furnace walls?

Mr. Egner—We have a shield made of sheet iron, with two arms; and before the retort is charged we put that in. This shield extends just beyond the brick wall. The arms are about 15 inches long and the ends rest against the lower retort lid. The coal brings up against that. The first lumps of coal strike the shield in charging, and then it fills up evenly to the top or end of the charge. When the coke is removed we open the door, as in ordinary retorts, and the shield is taken out. It is usually found to be a dull red. It is laid on the floor, and then out comes the coke.

Mr. Norris—I would like to ask the reason which induced Mr. Egner to say that the exterior angle is too flat. Is the difficulty in charging or discharging?

Mr. Egner—The difficulty is in the charging. It is not the retort angle, although the retort might be a little steeper without hurting it any; but the angle, or curve, rather, is too flat in the charging chutes which we have. The cast iron chute at the upper end is the one I mean. That should have the curve of a parabola, not of a circle. When sometimes we just touch the coke it rolls out the whole charge. Our retorts set only at an angle of 29°. It would be better if the angle was about 32°.

Mr. Norris—In charging is there any difficulty in regard to the coal coming clear to the bottom? In other words, do you get an uniform distribution of coal in your retort?

Mr. Egner—Yes; we have a uniform distribution of coal throughout the retort.

Mr. Norris—What is the mechanical condition of the coal? Is it very fine, or very clean, or just about enough fine stuff in it to fill up the cracks between the coal?

Mr. Egner—We take the coal at the shed, and allow no lumps larger than a man's fist to go into the hopper. There is fine and coarse coal altogether; but it all rolls down very nicely, and I have no trouble with it, except that spoken of before.

Mr. Mitchell—How does Mr. Egner explain the stopping of the coal in the bend of the chute—what caused that?

Mr. Egner—I think the bend was so slight that before the coal had a chance to roll down, it would bunch up and stop—it would not go any further.

Mr. Mitchell—I understand that the time of the upsetting of the wagon had something to do with the coal clogging in there—whether it was upset quickly, or slowly. Would not that cause the coal to stop at the bend?

Mr. Egner—No. I was going to say further that the castings are very rough; and that as they wear smoother they work better. We tried rolling it down slowly at first, and we thought that would overcome the difficulty, but it did not. When we would throw it down quickly it would shoot down nicely—and that even in the chutes with the double bend—or rather, sometimes it would and sometimes it would not, until we introduced the light sheet iron shield, which we made very steep, then it went down, without bunching up, when carefully dumped, without any trouble.

Mr. Coggshall—I would like to inquire if the coal at the further end of the incline was as well carbonized as the remaining coal through the retorts.

Mr. Egner—The coal right near the mouthpiece, of course, had some tar with it, and it was not as well carbonized as that which was a little further in. We thought, therefore, to make the shield about 6 inches longer. In fact, before I left I gave orders to have pieces put on to the arms, so as to keep the coal up a little further. It was not as well coked as that further up.

The President—Shall we hear from Mr. Clark on this subject?

Mr. Walton Clark—The points that I desired information upon have all been brought out by Mr. Egner's paper, and in the answers to the questions put to him. I am very glad to know the success that Mr. Egner has attained by the use of the inclined system. We all believe in it, and I believe that all coal gas works will eventually use inclined retorts. There are opportunities there for economizing in labor, and I think also in the fuel used in heating the retorts; and not only in the labor and fuel, but also in the brickwork and in the construction. For in the larger floor area of the retorts there will be very considerable opportunity for economy in first construction, after we have thoroughly mastered the details connected with the building.

The President—Someone has suggested that we would like to hear from Mr. Greenough.

Mr. Greenough—I cannot imagine why such a suggestion could be made, because I do not know anything about the subject. I was about rising to ask Mr. Egner if he could give any figures as to the number of men required to run that retort stack, in order that some comparison might be made as to the amount of labor required to run the retorts in that way as compared with the amount of labor required to run retorts by drawing machines. You have seven benches in a stack?

Mr. Egner—Eight benches of sevens. Before I tell you how many men we employed, I want to say this: You all know that in different sections of the country things are very different as to men. For instance, down in Old Virginia if you make a man work very hard he will throw down the shovel and go to work on the oyster beds; for he would rather work there for $3 per week than in a retort house at $2 per day. In New York, a good many years ago, year in and year out we charged eight benches of sixes with 350 pounds of coal per retort every four hours, and employed six men on each watch to do it. That was heavy work. If we tried to do that in St. Louis every man in the place would walk out. To handle the same amount of coal at St. Louis that we are now handling with the inclined retorts, we would have to have, including the foreman, 17 men on a shift, or 34 men in all; whereas with the inclined retorts we need have only 11 men on a shift. When we started this work we took men who had never been inside of a retort house to work. We picked up green men. We did not want to take the old men, but preferred to take strange men who had not worked in the retort house at all. It did not take long to get them in pretty good training.

Mr. Dell—I would like to ask Mr. Egner what is the maximum charge that he has made so far?

Mr. Egner—The maximum charge is 400 pounds for each four hours.

Mr. Dell—You also said that it took 20 per cent. of the coke made?

Mr. Egner—Yes.

Mr. Dell—Was the bench then running at the maximum?

Mr. Egner—No; I think we could have done better than that; and if the men had had more experience, or if *we* had had more experience, we could have done better. It was as well as we could do for the first 8 days.

Mr. Dell—I have had considerable experience with those furnaces, and I think it will be safe to say when the furnace is in thoroughly good working condition, and when the bench and everything connected with it is in good working order, the proportion of fuel used would be 10 pounds of coke to 100 pounds of coal carbonized.

The President—That is encouraging.

Mr. Somerville—I think I may preface the question which I am going to put to Mr. Egner by saying we all know the fact that the carbon in our retorts will form into ridges right across the floor of the retort after a certain period. It seems to me that the success of the retort will depend greatly upon having a smooth floor surface, so that the coal will run down without any hindrance. The question that was troubling me was this: If these ridges of carbon were to collect (as they do collect in our horizontal retorts) how would that affect the coal as it is put in? Of course, it would be impossible for it to run over these little ridges as it

was running through the new retort. Have you had any experience in that yet? Have you had the device long enough to see if this difficulty was really of importance? I am, of course, certain that the coke would not be able to slide out so easily with the carbon in the retort as it would without the carbon; and, therefore, I think in a year or so we will be better able to judge of the working of these retorts. I would like to ask Mr. Egner if he has seen anything of that before?

Mr. Egner—Yes, sir. You will remember that we have run one bench of 5's in St. Louis for over two years, every day in the year, until May, when we let it down as the furnace was burned out. We relined the furnace, put another coal chute on, and it is running now. If we had not had the experience suggested by Mr. Somerville we would not have put up the additional benches. We would not have gone to that expense if we had not had the two years' experience with the one bench. The retorts are in position there just as good as the day when they were put in. I will say, however, that it happened sometimes when visitors were at those works the men who were taking out the coke would prod away at the charge and take nearly three times as long as when no one was looking at them. They did that in my opinion in order to prejudice people against the inclined retorts. But after running the thing for two years and then starting that old bench up again, we claim to have had enough experience with that one bench to warrant us in building more, and, of course, with eight benches we will know more about it hereafter.

Mr. Boardman—I would anticipate some trouble in scurfing these retorts from the long chute of the lower retorts in the bench, which is made of cast iron, I presume. I would anticipate that you might encounter trouble there in scurfing them, and getting that too hot and cracking the cast iron. I would like to ask if that has been Mr. Egner's experience?

Mr. Egner—No. Of course I have not had charge of the old St. Louis works, except since January last, when the Laclede took hold of them; but I came down every once in a while to look at them. I was interested, and desired to see how the thing was going on. The scurfing was a very simple thing. They would open the upper and lower lids, the air would rush through, and in a few hours the carbon was loose enough to be taken out easily.

Mr. Boardman—I can well understand that you scurf very readily—it is eminently adapted for that; but I should anticipate trouble from that cast iron chute getting too hot. I would ask if that has been the case, or if it could be guarded against by the closing of the lower door? I want to know what experience you have had in that. If those chutes should burn out or crack from excessive heat it would be quite a costly thing to put them back into the interior of the furnace.

Mr. Egner—In the bench that we did run we had one burned at the mouthpiece, but it was not caused by the scurfing. In the original bench the mouthpiece was filled in all around. When we put the new chute on we put the wall back of it, but did not fill it up solid, and it did not crack again. I should think it was caused by that, and not on account of scurfing. We have scurfed retorts several times since the bench was started, and they are all in good condition except that one.

Mr. Greenough—I think this is a matter of very great interest. If the inclined retort is the best thing that can be used, and if we have got to come to it, we want to know it; and of course we have to watch what Mr. Egner does with a great deal of care. He will know a great deal better what difficulties are experienced after he has run a plant of this kind for a year than he can tell to-day. Do I understand him to say that the 11 men mentioned as running this stack do all the work there is—taking out the coke, and everything else? I want to make comparisons in my own mind as to what can be done with the machinery; and so I would like to know just what those 11 men do.

Mr. Egner—They bring in the coal, quench the coke, and attend to the furnace. One man attends to 8 furnaces. They draw the coke, charge the coal and clean up the house.

Mr. Greenough—Do they run the machinery with which the coal is lifted up?

Mr. Egner—Yes. The coal is brought in in wheelbarrows, and is then delivered by a bucket elevator into the square coal hoppers, and from the hoppers it is slipped into the wagonettes, and from those dumped into the retorts. One of those 11 men is a foreman who watches the whole of the proceedings.

Mr. Greenough—It is possible that if this series of 8 benches that are now put up were 16 instead of 8 there would be a still further economy in the amount of labor required to run them. As the comparison stands at present, with what can be done by machinery, and considering only the question of labor, I am not sure there is any economy. A large gas company can put coal into the retorts and draw it out again quite as economically by machines. We are putting into one stack of retorts as much as 450 pounds of coal every 4 hours, without any difficulty, and working it off. If so large a charge as that can be handled by hand, it may reduce the labor materially if carried on to any extent. Although it would look as though Mr. Coze had been followed up by Cathels (I have never looked at the drawings of Cathels myself, although they were in my office for some time, but nobody had the courage at that time to try the plan) certainly these gentlemen in St. Louis are entitled to very great credit for the success with which they have carried out the scheme; but before we throw up our hats and say that this is what we have all been looking for, let those of us who are engaged in making gas in other ways wait a little while and see how this plan works during the coming year, and then we will be a little more enthusiastic about it than we are to-day; although to-day we are prepared to congratulate these gentlemen on their success, thus far.

Mr. A. C. Humphreys—It certainly seems as if gravity ought to be able to do the work better for us than machinery; and, as Mr. Greenough says, it seems as though everything was in favor of the inclined retort, or at least was pointing in that direction. I do not know whether the paper answers the question or not, but I would like to know, if it is not stated in the paper, how long it takes to discharge each retort of the bench. It is the handling of the coke which seems to me to be the chief item of saving of this system. Of course the question of the handling of the coke has to be combined with the question of putting in the coal—because there comes in the angle; but if we have an angle which is proper for handling the coal so as to lay it in the retort evenly, how will it then be as to discharging the coke? What is the result of your experience as to the length of time required for discharging each retort? I was surprised to find at the Southall works, London, Eng., where the Coze system is in operation in accordance with the modified drawings of the patent which I think has been referred to, that they take a very much longer time to discharge than I had any idea of; for I did not suppose that so much time could be consumed in discharging a retort. To be sure, there is an explanation in stating that these retorts were 20 feet long, and at the works they had already recognized the mistake as to the length.

Mr. Egner—I would say that the average time of discharging the retorts would be about 30 seconds. It has one good effect upon our regular retort house men—they try to discharge the retort quicker than the inclined retorts would let the coke out. I used to tell about a fireman that I had (who has since become a superintendent himself, and has managed gas works for some years)—that he, another fireman and a helper used to draw and charge a set of ten retorts every two hours, with 250 pounds of coal in each, in 8 minutes, and that they did that all day long. They had to charge two scoops of coal into each retort (and they had only one scoop to do it with. I used to tell our men that, and try to get them to "hustle," as we say out West; but they would not "hustle." Now that we have the inclined retorts they *do* try to get the coke out of the horizontal quicker than the men can get it out of the inclined retorts; but they cannot do it. They can draw a horizontal retort in less than a minute, but the "inclined" men can take it out in less time than that. I would state from observing it, as I have done very carefully, that it takes about 30 seconds to draw an inclined retort. Some come out quicker, and with some it takes longer; but there is not over 8 seconds difference.

Mr. Russell—I would like to ask whether it is 8 seconds per retort or 8 seconds per bench?

Mr. Egner—Eight seconds per retort.

Mr. A. C. Humphreys—While the conditions at the London works I have referred to might have been a little unfavorable on the day that I saw the exhibition made, I will say it took from 4 to 4½ minutes to discharge each retort. The trouble about it was the length of the retort; and I think they recognized that trouble. I call attention to that point so that those who are working the inclined retorts had better think a long time before they put in any of such lengths.

Mr. Egner—I would say to Mr. Greenough that we are not yet committed to the inclined retorts. We are doing pretty well with them, but we are not irrevocably committed to using only inclined retorts. We are looking at charging and drawing machines also, and at water gas apparatus as well.

On motion of Mr. Humphreys the thanks of the Association were voted to Mr. Egner.

Mr. Edward G. Pratt, of Des Moines, Iowa, then read his paper on—

THE EXTENSION OF THE USES OF GAS FOR PURPOSES OTHER THAN ILLUMINATION.

The subject indicates, at once, that I am expected to enter that field of thought to which most of us have had our minds directed during the past 2 or 3 years, and which, it seems to me, is bound to occupy more and more of our attention during the same period of time now before us. "Gas for fuel" touches the popular chord, and more especially in localities where a large proportion of the fuel used is bituminous coal, and where, as a consequence, the inhabitants are suffering from the resultant smoke and dirt. To such the question of convenience seems to be only of secondary consideration, as with each recurring period when necessity demands the kindling of fires, and each chimney represents a miniature volcano, then does the supplication go forth, "Oh, if we only could obtain some other fuel than this miserable soft coal."

Is it sympathy with this suffering people that the same chord is set vibrating within our own breasts? I think not, else some means would have been devised long ago whereby a suitable substitute would have been procured. It is true we have done our best to keep up the supply of a substitute in the shape of coke, and at prices fluctuating with those of anthracite coal, so that as far as expense to the consumer is cornerned, it has been nearly as great and quite as troublesome.

To those living in mors favored localities, as pertains to the subject of fuel, these unpleasant experiences cannot be fully appreciated; hence the fuel problem, to them, is simply a matter of convenience. In this age of progress, however, the two words necessity and convenience have become nearly assimilated, and what seems applicable to one is fitting to the other. What, then, has been the motive that has caused us to energetically push our business in a direction, that, until the past few years, received but little of our attention and encouragement?

Formerly we were satisfied, seemingly, in doing that business that came to us, without making any special efforts, or offering inducements that would attract attention, for our business was that of furnishing gas for light; and that we discouraged its use for any other purpose is true, as the oft repeated question to a consumer who had reason to believe his bill was excessive, "Do you use a stove in your house," clearly indicated that any device, aside from the ordinary burner that consumed gas, we were in doubt about, and was not sanctioned by us, inasmuch as the too excessive gas bill was attributed to its use. Now, how different, being on the alert always, any gas-consuming device that we can consistently recommend for a purpose meets with our approval, because it fills a want and helps increase our gas sales account.

In my endeavor to answer this question, these thoughts naturally suggest themselves:

While gas companies of the large towns and cities throughout this country report large increases in their sales each year, may it not be attributed more to the increased demand for gas for domestic and mechanical purposes, contingent upon reduced rates, than to any other reason? Is it a fact that we have been stimulated to seek other methods of disposing of our product on account of the demands made and the success attained by electricity? And, somewhat contrary to the law governing such things, by which the demand precedes the supply, are we not to a great extent indebted to the numerous manufacturers of gas appliances for the energy and skill displayed in the devices they now aid us with?

Granting these, our duty lies clearly in keeping up with the possibilities as they appear before us, for we have reached a period now where the growth of our business depends upon constant vigiliance; indeed, it is about as necessary that we create a demand as that we supply it.

At the works under my charge we have made special efforts during the past season to create an impression upon the minds of the public favorable to the use of gas for fuel purposes, that is, to an extent consistent with its economical use; and, while we are aware that there are others who have made greater progress in this direction than ourselves, we are satisfied with having done better than was anticipated. And, while it is true that we have worked energetically, we have been very cautious about recommending only that which merited our approval, realizing that one defective or inferior appliance would do us more harm than 50 perfect ones would do us good. For this reason, as much as for any other, we have been opposed to the rental system. Stoves kept in stock for rental purposes naturally become old stoves, and perhaps have been turned into this stock because they were unfit to sell, hence, in my opinion, they are unfit to use.

We do, however, approve of payment by the rental system; that is, a sufficient charge for rental is made to secure the payment of the stove in full within, say, six months. By this method you reach a class who otherwise could not afford to purchase outright. We secure a consumer, and good care of the stove is assured, and there is less liability of its working being condemned.

Previous to this year, we labored under the disadvantage of not having sufficient space to show off a stock of stoves, having depended entirely upon the few samples displayed in our office, and from which sales were made.

This was very unsatisfactory, for, aside from the fact that it required the attention of a clerk from his regular work, and who, perhaps, was unable to talk stove or gas for fuel, the idea of having to wait until we could order from the sample selected, oftentimes precluded an opportunity for sale; and, judging from the dispatch with which some manufacturers have failed to fill orders this season, it is very fortunate we laid in a stock early, as the desire would have languished by the time the stove was received. Influenced, therefore, by what others of good judgment have done, we rented a storeroom on a prominent corner, and stocked it with as many stoves, both cookers and heaters, as space would permit, not forgetting to arrange them in as attractive a manner as was possible, making also a display in the windows.

The different types and sizes of stoves and other gas appliances were connected up ready to show at any time. Then we employed a man, competent to make practical demonstration of what could be done with a stove—in other words he could cook, with instructions not to allow a customer to escape through any doubt as to whether this thing or that could be done satisfactorily with a gas stove. Then we advertised—we advertised in everything that would advertise us—and it is wonderful the number of advertising mediums there are, and the friends you have, when once you have expressed a disposition to advertise.

The fact that we had gas appliances to sell, however, was not of so much importance as that, for gas used for fuel purposes, we made a special rate of $1.50 per M., the former price, and also, that for illuminating purposes being $2 per M. The stoves were sold at about 10 per cent. advance over the manufacturers' prices, and we set them up at no expense to the purchaser. These three things—reduced price of gas, stoves at cost, and no contingent expense for setting up—have done more to assist our enterprise than anything else. It has not only resulted in getting many of our regular patrons for light to use stoves, but has attracted the attention of many who had not thought of using gas for light even, to place a stove in their homes; skeptical though they were at first, some of our best references now come from this class.

Realizing, too, that we had a powerful competitor in the vapor and oil stoves, we have lost no opportunity of displacing these whenever such opportunity presented itself, and have made liberal allowances for such in exchange, knowing full well that a gas stove, once set was a consumer gained. And because a gas stove had been recommended to them as being an expensive luxury, finding it otherwise, we have in these our strongest advocates.

To lend interest to what already had been done, we, very early in the season, engaged the services of a young lady, well up in the art, to give a series of cooking lessons, using, of course, a gas stove in the preparation of the food. It is unnecessary to say that this was a very taking feature; and being quite inexpensive, inasmuch as an admission was charged to give tone to the affair, which paid the expenses, resulted in very much good to us; for, besides creating an interest in behalf of the gas stove for those who had never used one, the fact was clearly demonstrated to others who had, that there were many things possible in their operation that they had no previous knowledge of.

These practical illustrations demonstrated the fact that a gas stove is not only a summer stove, but is invaluable for winter use as well, where cooking is reduced to a science by means of quick regulation and easy operation; and we have several instances now in mind where arrangements for warming the kitchen in winter by the furnace have been made, the intention being to perform the family cooking with a gas stove throughout the year. Hence, while it has been previously supposed that about all the stoves we could dispose of must be during three of the summer months—and to a great extent it has been true—I believe it to be a good policy to keep them before the people in such a way that they will have cause to know there are many things for which they can be used and concerning which we are familiar. Heating stoves are looked upon with favor, especially for intermittent work, and we are very careful in explaining to what extent a gas heating stove may be economical. They are, as is well known, convenient things, and will be largely used when the price of gas will admit.

The same thing would partially apply to the gas engine, though from experience I can say little in regard to them, as we have none in operation in our city, the two there having long since been displaced by electric motors. It seems to me, however, that the first cost of a good gas engine precludes their more general use for one thing; then, again, the

manufacturers of the various types of electric motors have canvassed every town and city in the country where they could obtain current for the sale of their goods. Might not something be accomplished if the gas engine manufacturers displayed the same enterprise?

There is no doubt but that with gas at $1 or $1.25 per 1,000 a gas engine of from one-horse power to 10-horse power could be operated quite as cheaply as the prevailing charge for electric current, and certainly more satisfactory, for it could be depended upon, which cannot be said of the electric motor.

Of course, very much depends upon location, as to the cost of making steam, and the consequent success of a gas engine; but it seems to me that with some assistance from the manufacturers, and an effort on our own part to make a rate for gas, consistent with their operation being made economical, there is an opportunity for the gas engine, such as it has never yet had. Having had but little practical experience with a gas engine, I am not posted as to their efficiency, though I have received statements from superintendents of gas companies operating electric lighting stations, which would indicate that other fuel must be very cheap to compete with them, at the cost they charge themselves up with for gas. If this be true, and I have no reason to doubt it, then I believe that gas companies operating electric lighting stations should, where possible, in making future improvements, adopt the gas engine. If we have any confidence in the gas engine and expect to have it in more general use we must, at least, use it ourselves, and the manufacturer of engines, together with the manufacturer of stoves, must give us the best possible apparatus for the least possible money, so that the average purchaser can afford to buy.

Since May 1st of this year, when our special rate went into effect, we made a practice of setting a separate meter for each consumer where gas was used to any extent for fuel purposes; the question of estimating gas for such purposes being unsatisfactory, necessitating an argument with each settlement, in which the consumer usually affirmed that there had been very little gas used for light.

The question here arises whether it is good business policy to make differential rates favoring that used for fuel, especially if it becomes necessary by so doing to set a separate meter where there is one already set; to which I would say, yes, unless it be that there isn't enough difference between rates for light and that for fuel to warrant it; and then I would be tempted to say, make another reduction in your fuel rate.

Upon this subject I have been very much interested in reading an article in the American Gas Light Journal of January 28, 1889, and I think I cannot do better than quote one paragraph therefrom: "The recommendation of such measures (referring to differential rates) by the slow acting but ever studious authorities of the German government plainly shows that they, at least, pay no heed to the thought that has made so strong an impression on the policy of some American gas companies—the idea that special rates may prejudice them in the regard of the consumer in general; and the statistics given must cause an extension of this verdict to the German gas companies in general, the proprietors whereof are content in the knowledge that a wise system of discriminative rates has neither involved them with their consumers as a class, nor interfered with their receipt of a legitimate profit. Indeed, quite to the contrary in the latter regard. A public clamor in regard to the shrinking of gas rates in any department of supply to the lowest possible figure is not to be feared—at least where the maximum rate is a reasonable one; and it would seem to be, to say the least, supersensitiveness to entertain such a belief in localities that have considered the public interest in consulting their own."

In our city of 52,000 people, with the gas consumption averaging nearly 5,000,000 cubic feet per month, our gas sales have, during the eight months of 1890, increased 22.18 per cent. over a corresponding period of time in 1889; 70 per cent. of which increase I attribute to fuel purposes, made possible by a reduction in the price of 50 cents per 1,000.

I estimate that of all gas sold, the percentage for fuel purposes for five months previous to September 1, was about as follows: April, 7 per cent.; May, 10 per cent.; June, 14 per cent.; July, 17 per cent.; August, 16 per cent.

During that period we sold 121* stoves of different sizes, receiving therefor $1,945.42. The net value of all stoves, etc., on hand September 1, over that of April 1, was $916.83.

Our total expenditures for everything incident to gas appliances, during the same period of time, amounts to $3,520.79.

Deducting value of stoves on hand September 1, as above ($916.83), leaves our net expenses as $2,603.96, being in excess of receipts for stoves and so forth, $658.54. The profit derived from the gas consumed in these stoves during the period covered by the account (five months) was in excess of the loss shown on the stove account, and the stoves continue to use gas at the regular price. Our Company believes the investment to be a good one and that it will be returned to us many fold.

Incidental to this we have been obliged to lay two miles of mains, brought about through the interest created in gas for fuel, in a district remote from the center of distribution, and previously covered by the electric light. We expect to secure liberal patronage, not only in the use of gas for fuel, but for light as well. I might mention that we supply the electric light, but that makes no difference, for we had just as soon relieve ourselves of an electric light patron as we would a competitor.

Already I have had numerous inquiries made as to the feasibility of heating residences by gas, and hardly a day passes but that I am besieged by some enthusiast who "believes he has an idea" that he can heat his house economically by gas during the approaching winter, and seems really disappointed when informed that at this time, and the present price, we would not care to make the attempt, knowing full well what the result would be.

"All things are possible," however, and we hail the day when it will be our privilege to conscientiously proclaim "Eureka."

Discussion.

The President—Gentlemen, you have listened to a paper which interests every member of the Association. It is a paper which should receive your careful consideration and discussion.

Mr. Butterworth—The subject gives rise to a very discouraging and hopeless reflection on the part of a great many gas companies located in towns in Pennsylvania, Ohio, and Indiana, where they have natural gas. The question of interest to gas companies there is not so much how to extend the use of gas for purposes other than illumination, but is rather how shall we be able even to hold the consumption we have for illumination, as against natural gas. Heretofore, and previous to the introduction of natural gas in Columbus, we sold gas stoves at cost, and did everything we could—changing gasoline stoves for gas stoves, and sold gas at $1 per thousand feet. Now we would be very thankful if we could get back the old consumption that we had for illumination. We cannot hope to compete with natural gas at 10 cents per thousand and artificial gas at $1 per thousand for purposes other than illumination.

Mr. A. C. Humphreys—I would like to suggest one hopeful thought to Mr. Butterworth, which is that perhaps the natural gas regions are the most favored in this regard, for they will have their people there so educated on the gas question that they will never want to abandon the use of gas. If they will just hang on by the teeth until natural gas goes out, they will have a chance when illuminating gas again comes in. One point in Mr. Pratt's paper ought to receive very careful attention at the hands of our members. I refer to these words: "If we have any confidence in the gas engine, and expect to have it in more general use, we must at least use it ourselves, and the manufacturer of engines must give us the best possible apparatus for the least possible money, so that the average purchaser can afford to buy." I think we have a perfect right to look to the gas appliances manufacturers to do even better for us than they have done in the past. Although Mr. Pratt in his paper has given them great credit for their work in the past, I feel that, especially in the line of gas stoves, we have a right to expect more; that we have a right to expect better stoves at lower prices. I prophesy that if the gas appliances men do not give them to us, we will get them for ourselves. It is coming, as sure as can be. And the same thing is true with regard to gas engines. If the gas engine men will not give us the proper gas engine, we will get it outside of their help; and even if we have to wait until the patents expire, we will have it then. I do not think, though, that the patent question will interfere. We have a few good gas engines, but I am free to say I do not think the gas engine interest in this country has been handled with the slightest degree of liberality. I refer especially to the one engine which has made the greatest advance. I think we have every right to expect better and more liberal treatment from the gas appliances men. If other questions in connection with our business had been handled in the same way that those questions have been, I do not know where the gas business would now be.

Mr. Taber—I would throw in a compliment to our gas men because I think Mr. Pratt has rather underrated the percentage of gas sold for gas stoves in the summer time. I remember that in our Guild in Boston we had a comparison of figures as to the amount sold for lighting and cooking purposes by New England companies during the summer, and I think I am not wrong in saying that the average came nearer 25 or 30 per cent. of the daily consumption than what I take it to be here in this paper—16 or 17 per cent. It was certainly very high. Perhaps the reason is to be

* Since this paper was written we have sold 55 in addition to this number.)

found in the fact, from some figures that I tried to get awhile ago, I have reason to believe that the gas companies have been instrumental in getting out more than 10,000 gas stoves in New England within the last three or four years. I think we ought to encourage ourselves in that matter, and not alone in respect to cooking stoves, either. Some three or four years ago a gentleman who was connected with our Company told me very gravely he thought we should not get out any more gas stoves; but since then we have got out 500 gas stoves. So I do not think that many of us know to what extent this will develop. In the heating stove, as in the cooking stove, there is great room for us all. Last winter I had occasion to heat a block that had previously been heated by ordinary coal stoves. I put 14 gas stoves into that block and succeeded perfectly. I had no difficulty whatever. I throw that out as a suggestion to many of you. It seems to me that we generally think the gas stove season is over when the birds go South; but I think that the money part of it comes just when they go; for there is more money (if we do not tell the public of it) in gas heating stoves than there is in cooking stoves. As to this matter of special and differential rates I may say we had quite a question over that, and I want to say a word about how we did in New Bedford. Our regular price at that time was $2, with 10 per cent. off. In order to facilitate the introduction of gas stoves we made a special rate to anyone who would use over a certain amount of gas every month—say about 4,000 feet. We counted the house lighting and the fuel gas together, and if a party used over about 4,000 feet per month, we put the price at $1.50. In that way we avoided the necessity for an extra meter (which Mr. Pratt put in), and accomplished our object very satisfactorily. I think there is a great future ahead of us; and I am glad to see that during the past summer so many novelties and so many conveniences have been added to the gas stoves which have been lately developed. I am very glad to re-echo the remark which has been made, that the best gas stoves are going to be very much cheaper than we have had them heretofore.

Mr. Boardman—Mr. Pratt calls attention to the employment of the gas engine by those gas companies which are engaged in electric lighting. Having occasion to go into electric lighting, I took the opportunity to look into the matter of substituting the gas engine for the steam engine, under the conditions there existing, and, considering the size, the demands upon them, and the cost of fuel and the cost of gas in the holder, I found that for 100-horse power the cost for fuel to a gas engine running 12 hours was $13.50 as against $8.25 for coal to be used under the boilers to generate the same power. Allowing for the labor additional in the case of coal and it leaves about $3 per day (or night) against the gas engine. The first cost of the gas engine to get that power was a little in excess of the cost of the boiler and engine using steam.

The President—Will you also give us the price of coal per ton, and the price of gas per 1,000 feet?

Mr. Boardman—At that time my gas was costing me 45 cents per 1,000 feet, and the cost of coal was $2.75 per ton. I am figuring on the large consumption of coal which was necessary at that time when I was using high speed engines. More economy can be obtained in the coal than that, but I do not think that much more economy can be obtained in the gas engines than I have stated. Another thing that deterred me was it would take about 20 per cent. of all the gas that I could at that time supply to furnish the gas engine; which would force me to have a bench in operation when I only had use for one-half of the gas that it ought to make. I did not think the economies to be derived, or the advantages in setting a good example, were quite sufficient at that time to induce me to get the gas engine. I merely state this as a piece of information which you may think over.

Mr. Taber—I will supplement that piece of information by saying that in one of our New England stations the Superintendent and I went carefully over the figures together, and we found that in the gas engine the horse power was developed with gas equivalent to about three pounds of coal. That is, we could supply the gas at the cost of three pounds of coal per horse power.

Mr. A. C. Humphreys—What we are speaking of is the consumption of gas per horse power per hour; and I would ask Mr. Boardman whether he has taken into consideration the fact that the cost of his gas is not any longer 45 cents per 1,000 if he has added 20 per cent. to his output.

Mr. Boardman—I was figuring on the gas consumption, which was about 25 feet per horse power per hour. I did not take into consideration the fact that the cost of my gas would be reduced by increasing the output; but I found that the decrease in the cost of gas by reason of increased output would be to some extent lessened on account of my not being able to use the full bench for that purpose.

Mr. Dixon—I beg to say that it seems to me that for large engines, say 25-horse power, gas cannot compete with coal; but that for small powers it is away ahead, and that it is also away ahead of the electric motor. I know that in looking up the figures for the cost of small powers in New York, I found that electric motors could be furnished by electric companies in New York at the rate of $1 per day, and that a gas engine would require for the same power, at the cost of gas in New York, 75 cents per day. There is a saving of 25 cents. If the gas engine builders would be as liberal in furnishing their motor as the electric companies are now furnishing the electric motors the difference would be still more apparent. But for such small powers it is now considered cheaper in New York to hire the motor and the power all in one lump.

Mr. Coggshall—If gas engine builders had put the same amount of work into disposing of their goods that the electric light manufacturers do with their apparatus there would be no difficulty in gas companies having something to do with the gas engine. There is not a town or a city where there is an electric light station but what you find men canvassing for motors. A great deal of that is done. Take for instance the oil stove. You cannot go through our city, or through any other city, and pick up a newspaper but you will find an advocacy of certain kinds of oil stoves. Who pays for it? The oil stove manufacturers, to my certain knowledge. But, for anything else than an oil stove, as for instance a gas stove, if we advertise that we have to do it at our own expense. If the manufacturers would join with the gas companies the business could be increased to a large extent.

Mr. Scriver—It seems to me the question of the price of gas stoves lies entirely in our own hands, for we can manufacture them ourselves and furnish them to our consumers at the very lowest cost, and a good deal cheaper than by buying them from manufacturers and selling them at a profit. That is one reason why gas stoves are not more extensively used. In my city we have paid special attention to this branch of industry. We sell our gas, and have, from the beginning of the introduction of gas stoves, at a very much lower rate than for ordinary purposes. We put our gas down to $1 per 1,000. We considered that it was a wise step and that it is a wise policy. We have increased our manufacture of gas to a very great extent by the introduction of gas stoves. We have sold and put out a great many gas stoves for the reason that we have been able to manufacture our stoves ourselves, and to sell them at a very small profit. It is a surprise to me, when we consider that there is a very large business with gas engines, that the gas companies have not taken hold of the gas engine industry and worked it with greater vigor; but I can easily understand why a gas company should have let alone most of the gas stoves on account of the very excessive price. It seems to me that the manufacturers of gas engines will not make a gas engine and sell it unless they can get about the same profit proportionately that the manufacturers of our sewing machines, or of our pianos do, and which we know is very excessive. I will give you one instance only. We have a large number of gas engines out in Montreal, but in one particular case a 7-horse power gas engine has been running, in a printing establishment, for the last 7 or 8 years, at a cost of about 80 cents per day, for 10 hours' running. Previous to that they had a little steam engine and boiler in their printing room, which caused a great deal of inconvenience in summer on account of the heat, and a great deal of inconvenience at all seasons of the year on account of the dust that it created. They introduced the gas engine, and they are very much pleased with the result in every way. The cost, as I have said, is about 80 cents per day for the gas engine, while the other engine (the steam engine) cost them about $1.20 per day—showing a difference of at least 40 cents per day in favor of the gas engine. I believe if we were all to work up the gas engine trade as well as the gas stoves we would find our output of gas materially increasing from year to year. I believe that there is another point we ought to take hold of. I have not yet seen a gas burner that was adapted to heating water in our boilers for heating our houses. Not a fall that comes when I do not have a large number of persons who ask us, "Can we not heat our houses with gas? Can you not invent a burner that we could use in our boilers for heating our water?" A large number of our houses in Montreal are heated by hot water and steam—the greater proportion of them; and when the time has arrived that we can have a perfect burner for heating the water in our boilers, then I think we can all exclaim, in the last word of this paper, "Eureka!"

Mr. Littlehales—I would like to ask the last speaker if he can give us an idea what his stoves cost when manufactured by his company. I may say that we in Hamilton experienced the same difficulty that others have referred to with reference to the cost of stoves. We found that after paying import duties, in order to sell the stoves at a very small profit, the consumer would have to pay $20 or $30. Now, those stoves are being made at a cost of $17. We are selling them at $17, cash, or

we rent them at $4 per year, and after the fifth year they become the purchaser's own. The cost for a four-hole stove, about the size of a No. 8 stove, is $17. I would like to inquire how the cost of Mr. Scriver's stoves compares with that.

Mr. Scriver—Such a stove as Mr. Littlehales speaks of we could not sell in Montreal at all. They are too cheap.

Mr. Littlehales—I will say that the stove that we are selling at $17 is as good a stove as any that Mr. Scriver has in his place.

Mr. Scriver—We sell and put up in consumers' houses a stove similar to the Goodwin No. 8 or No. 8A, with four-holes on top, extension wings, and all the latest improvements, cast iron front and top, and nicely nickel plated, including all the fittings to the stove from the service pipe, and including an extra meter, with the fittings and stopcock complete, for $30.

The President—I have been compelled during the past summer to concede the fact that there are two sides to the question of cheap stoves. That has been something of a hobby with me for some years at Columbus—selling stoves at cost, or at manufacturers' prices, and setting them up for nothing. The plan was so successful there that I got to believe that that was the only way I could make the stove trade successful. After going to St. Louis, the time for the stove trade came around, and the question was raised as to how they should be handled. There was a very considerable opposition to the idea of the gas company handling stoves at all. We finally agreed to set up without charge the stoves of any company that would sell their stoves at manufacturers' prices. We were able to get one concern who agreed to do that—they having nothing to do with the stove except to keep it in their warehouse and sell it. Our man would go to the warehouse, get the stove, and set it without charge. A manufacturer of stoves in the city did not think that there was any money in that sort of business for him, and so he wanted us to set his stoves for nothing, and let him sell at a profit of 40 per cent. above the manufacturers' charge. We would not agree to do that unless he would sell more than 350 stoves. If he sold less than that during the summer he was to pay us $350 for setting his stoves up; and if he sold more than that we would make no charge for setting those stoves. As I said, there was another good stove there which was offered at manufacturers' prices. I think that over 1,300 stoves have been set in St. Louis during the past summer; and even now, this late in the season, they are being set at the rate of 50 or 75 per month. I venture to say that 80 per cent. of them were stoves of the man who had the 40 per cent. profit. He established about 50 stations in the city for the sale of his stoves. He would put a stove in the house of everyone who would sell a stove or handle them at all. He had 50 solicitors throughout the city, and he pushed his work for all that there was in it; and he has made a great deal of money, and we have sold lots of gas.

Mr. McDonald—I would like to ask Mr. Scriver where they set the meters that are used in connection with gas stoves?

Mr. Scriver—We set them as close to the service pipe as we can get them.

On motion of Mr. McIlhenny, a vote of thanks was tendered to Mr. Pratt.

(To be continued.)

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

THE city of Chicago, in its public buildings and street lamps, during the quarter ended October 1st, used gas amounting in value to $125,000.

THE proprietors of the Centralia (Ills.) Gas Company have decided to engage in the supply of electric currents. The plant to be put in the gas work's buildings.

A CORRESPONDENT writes that the United Gas Improvement Company will in all probability shut down the works at Wyandotte, Kansas, the gas supply for the latter place to be drawn from Kansas City, Mo., which place is about 3 miles below Wyandotte. The change could be made with economy, as the Improvement Company is also in control at Kansas City.

THE Directors for last year in the Consumers Gas Trust Company, of Indianapolis, Ind., have been re-elected.

MR. E. A. PINKNEY, formerly in the service of the Fulton Municipal Gas Company, Brooklyn, N. Y., has been appointed Superintendent of of the Killingly Electric Light Company, of Danielsonville, Conn., the gas supply of which town is also under the control of the Electric Light Company.

THE City Water and Light Company, of Abilene, Ills., has been incorporated by Messrs. C. F. Coffin, B. A. May and J. Q. Martindale. It is capitalized in $250,000. The object is to construct and operate a system of water and electric light and gas works, but it is probable that the first-named function will be the one to which the energies of the incorporators will be devoted.

MR. MICHAEL P. MALONEY has been appointed Superintendent of the Duquoin (Ills.) Light, Heat and Power Company, vice Mr. James Ward.

WORK has been commenced on the gas plant for Rapid City, Dak.

TOWARDS the close of last month arrangements were perfected under which the Kingston Electric Light Company absorbed the properties and franchises of the Rondout and Kingston (N. N.) Gas Light Company.

ACCORDING to the public prints of Boston, the Attorney General of the State has been notified by the Board of Gas and Electric Commissioners that the following named Gas Companies had (up to the 1st inst.) failed to make their returns by the second Wednesday in September, as required by the laws under which the Commission was created: Citizens Gas Light Company, of Quincy; Gardner Gas Light Company, Middleborough Gas and Electric Company, Lee Gas and Electric Company. The electric companies failing to report were: Adams Electric Light and Power Company, Edison Electric Illuminating Company, of Lawrence; Middleborough Electric Light and Power Company, Milford Electric Light and Power Company, North Attleboro Steam and Electric Light Company, Pittsfield Illuminating Company, Union Electric Light Company, of Franklin; United Electric Light Company, Springfield; Ware Electric Light Company and Weymouth Light and Power Company. A perusal of this list shows that the gas companies pure and simple of Massachusetts can be depended on to follow the mandates of the law—even though such mandates oblige them to actually show to the public the innermost secrets of their business. It would also go to show that the companies in reality have nothing to fear from publicity, provided the law in return shall protect them, when the greed of opposition shows its hateful visage.

"OBSERVER" sends the following, clipped from the Wilmington (Del.) *Every Evening*, dated November 8th: "The local campaign, notwithstanding its frauds and its fierceness, was not entirely devoid of humor, and perhaps the most stupendously funny contribution to the contest was furnished by Mr. J. Edward Addicks, the Claymont gas stock speculator and whilom aspirant for the seat in the United States Senate which fell to the lot of Mr. Higgins. Mr. Addicks, it appears, allowed somebody to stuff him with the strange notion that the Wilmington Coal Gas Company was running this election, whereupon, as a stockholder in the Company to the extent of 5 shares, he proceeded to solemnly protest by wire, as follows: 'Philadelphia, Nov. 2, 1890.—Edward Betts, President: I have reliable information that your Company is contributing to political purposes for the purpose of influencing the election of members of the Delaware Legislature to-morrow. As a stockholder I protest against this misuse of the funds of the Company, and will hold you and the Directors to a strict accountability legally.—J. Edward Addicks.' This message would have been sufficiently mystifying to Mr. Betts in its entirety, but to make matters more bewildering it came in two sections, the first of which went to the house and the second to the office of the Pusey & Jones Company. Naturally, Mr. Betts could not make head or tail of the unfinished and unsigned fragment he held in his hand, and it was only after inquiry at the telegraph office and considerable brainwork that he finally got at what Mr. Addicks was trying to convey. Having accomplished this and enjoyed his resultant hearty laugh over the gullibility of mankind in general and senatorial aspirants in particular, Mr. Betts wired back as follows: 'Wilmington, Nov. 2, 1890.—J. Edward Addicks: Statement of your informant absolutely and entirely false. I thought you too smart to be humbugged with such nonsense. Keep your own record clean, also.—Edward Betts.'"

THE Capital Electric Light, Motor and Gas Company, of Boise City, Idaho, has determined to increase its capital stock to $40,000, with the intention of doubling its present incandescent electric lighting plant and installing a 50-light arc plant.

OVER a fortnight ago counsel for the Suburban Electric Light and Power Company, the Boston Electric Light Company, and the Edison Electric Illuminating Company, were given a hearing by the Attorney-General on the report of the Board of Gas and Electric Commissioners,

that the first named Company had placed wires over various streets in Boston without permission from the Aldermen, this report being the result of a petition by the other Companies to the Board to that effect, filed last spring. Now, the petitioners ask the use of the name of the Attorney-General in legal proceedings before the Court. The consent will in all probability be given.

VICE-CHANCELLOR VAN FLEET recently heard argument on an application, by E. S. Greeley & Co., of New York, for the appointment of a receiver for the Perth Amboy (N. J.) Electric Light Company. The object of the application was to compel the payment of the claim of the bondholders out of any assets that *might* be found. The sum involved is $40,000.

THE "Gas Company's man, Mum," is again stalking through the City of Churches, this time in the Nassau Company's district. So far he seems to have levied an assessment on a Mrs. Sterling, of No. 199 Quincy street, in the shape of $26 worth of her jewelry. He gained access to the premises on the plea that the Gas Company had sent him to "look over its pipes." Every outside employee of a gas company ought to be obliged to wear a badge of some sort.

THE suit of Geo. S. Rhodes and wife against the Washington Gas Light Company was recently tried in Circuit Court, before Judge Montgomery. This was a suit for damages claimed to have been sustained by Mrs. Rhodes, on the night of December 3, 1887, through having fallen into an excavation made by defendant for the purpose of laying a gas main in Columbia road. Plaintiff contended that defendant was negligent and responsible in not having located barricades or placed lights for the purpose of warning passers by of the dangerous condition of the roadway. The damage amount was put at $20,000. Defendant, through its agents, testified that the excavation made by it had been filled in when the gas main was placed and its work completed, and that the District was the culpable party, in that it kept the trench partly open for the purpose of lowering a water main. The jury found for the plaintiff, assessing the damages at $2,500. Messrs. Campbell, Carrington and Williamson for the plaintiffs; Messrs. Davis, Webb and Webb for defendant.

WE are in receipt of the following circular, issued by the Capital City Gas Light Company, of Des Moines, Iowa, under date of Nov. 1st, which rather goes to show that Manager E. G. Pratt and his employers are quite up to the practice of "Managing Gas Works Efficiently," vide our remarks in the last issue of the JOURNAL respecting Mr. Cowdery's paper (read by him at the Savannah convention) on the "Mismangement of Gas Works." The circular reads:

"*To Consumers of Gas.*—We take pleasure in announcing that a reduction in the price of gas has been decided upon to take effect November 1st, 1890, from which date the price will be $1.80 per 1,000 instead of $2 as formerly. From this price a discount of 10 cents per 1,000 will be allowed for prompt payment of bills, making the net price $1.70 per 1,000 cubic feet. It will be noticed by this that the sliding schedule of rates has been abandoned and that the price for general consumption for illuminating purposes will be the same, our intention being to treat all consumers alike by giving all the benefit of a reduced price. For gas for stoves and other gas appliances a discount of 30 cents per 1,000 for prompt payment will be made, making the net price for these purposes $1.50 per 1,000 cubic feet. To consumers using 10,000 cubic feet per month an additional discount of 25 cents per 1,000 will be made, making the net price $1.25 per 1,000 cubic feet. This voluntary reduction in price is made to show our appreciation of the liberal patronage we have received, and to bring the use of gas for illuminating purposes within the reach of all; and we have no hesitancy in believing that this action on our part will be appreciated. It is our purpose to increase the illuminating power to as high a standard as may be found in any other city in the United States, and to otherwise make our service as perfect as possible. We would, therefore, invite our customers to report at once to the office of the Company, 226 Third street, any difficulty they may experience from poor light resulting from defective service pipes, fixtures or burners, that the same may receive our prompt attention. The complaint of poor gas or poor light may be almost always attributed to burners that have been in service for a long period, and we would take pleasure in removing these and substituting new ones. We desire especially to have it understood that we are as much interested as are our consumers in the service they receive, and the economy which they are able to display in the legitimate use of gas in their places of business and residences, and it will be eminently more satisfactory to us to have a large number of consumers paying bills monthly that are satisfactory to them and representing satisfactory service than for a smaller number of consumers paying large bills for that which had not given them entire satisfaction. We, therefore, ask that our patrons advise with us as to what is best for them to do in the matter of light and fuel before accepting statements made by disinterested parties."

IT is said that the new water gas auxiliary plant of the Pittsfield (Mass.) Company will be in working order by December 1st.

ANOTHER of the paper writers of the convention in Savannah (Mr. E. G. Cowdery, of Milwaukee, Wis.), has shown, and is about to illustrate the fact anew, that good management makes cheap gas possible. Although the announcement at this time is not official, there is nevertheless ample base for the assertion that the Milwaukee Company, in consequence of its improved position through the works enlargement recently completed, is about to order an important concession in gas rates, that were already looked upon as extremely liberal, the concession to go into effect on January 1st, 1891. The rates probably will be, to ordinary consumers, $1 per 1,000, while the city and large users may get their supply at 80 cents, the latter rate possibly also to apply to gas used for heating, cooking and power purposes. The ruling rates run from $1.20 per 1,000 down to 90 cents. Thus Milwaukee is to have the credit of selling gas at the cheapest rates, all things considered, that obtain in this country; and that remark leads to the query, "Would Milwaukee have gas at that price, were its gas works operated by the municipality?" A most emphatic "No," would best answer the conundrum. The following changes in the gas schedule at Milwaukee will not be without interest:

Year.	Price per 1,000.
1869	$4.50*
1870	4.00*
1871	3.50*
1872	3.30*
1874, meter rent abolished	3.30
1875	3.00
1876	2.50
1878	2.25
1882	2.00
1883	1.80
1884	1.60
1885	1.40
1888	1.20

* Plus meter rent.

Is not this the record of a liberal and progressive Company?

MAJOR J. J. GORDON, President of the El Paso (Tex.) Gas, Electric Light and Power Company, although a resident of the State which prides itself on giving residence to the Hon. Mr. McKinley, and perhaps an admirer of that clever and redoubtable Congressman, is, we believe, in favor of reciprocity, in so far as illuminating gas is concerned. In any event, Major Gordon and his associates are now busily engaged in exporting gas from El Paso, Tex., to Juarez, Mexico—formerly known as El Paso del Norte—and the Juarezites have not seen fit to agitate the question of levying a tax on the Major's pipe line shipments. The Company, now that it has been thoroughly equipped for business, flourishes, and Superintendent Hickey has his time well taken up.

THE proprietors of the Hudson County (N. J.) Gas Light Company have reduced the price of gas in their district from $2 to $1.90 per 1,000 cubic feet.

MR. WILLIAM J. FAY, President of the Denver (Col.) Gas Company—who, by the way, was greatly missed at the Savannah convention—has filed a bill for $6,000 against the city on account of damage to the Company's mains caused by the authorities in the carrying out of their work on the city's sewers, etc. The following memorandum accompanied the bill: "*Hon. Wolfe Londoner, Mayor*—Herewith find bill for damages to our mains and services, on parts of 16th and 15th streets. This bill covers only those damages which occurred up to the 23d of October. Damages of equal or greater amount have been caused by similar negligent work between the 23d of October and this date. While we have no desire to retard the work of your contractors, we are compelled to direct your attention to the fact that the construction of a permanent roadway over ground but recently disturbed by sewer work can but result in great expense to the city and inconvenience to the property owners and this Company. The continual settlement of the sewer excavations is carrying the pipe of this Company out of both horizontal and vertical alignment, thus breaking both main and service pipes. The condition of these pipes and the ground will necessitate almost continual breaking

of the surface during the ensuing winter. There is at the present time a break in the pavement on 15th street. We therefore desire to notify you that our interests must receive reasonable consideration, or we will be compelled to resort to such measures as will protect our interests. As citizens and taxpayers we are entitled to more consideration than either yourself, your officers or workmen seem willing to extend. Permit me to say, further, that the bill herewith inclosed will not nearly repay this Company for the annoyance and inconvenience that we have suffered in this matter."

THE authorities, although they profess to regard the position of the Company as entirely untenable, are nevertheless much pertubed about the bill and its blunt accompaniment. Beyond a doubt the Company has a good case against the city, and President Fay can be relied upon to exact from the municipality every farthing that it owes the Company. The case will undoubtedly be referred to the courts for settlement.

THE new holder for the Pekin (Ills.) Gas Company was not completed any too soon. In fact, some days before it was ready for inflation the old vessel "sprang a leak" that threatened to put the town in darkness.

AT the annual meeting of the Harrisburg (Pa.) Gas Company the following officers were chosen: President, George W. Reily; Treasurer, F. A. Awl; Secretary, J. Wesley Awl.

MR. JOHN W. KIRK, a prominent citizen of Newport, Ky., died at his home in that city on the 5th inst. He was a shareholder in the Newport Light Company. Deceased was born in Massachusetts, 38 years ago, and graduated in due course from Harvard College. He settled in Newport about 16 years ago, and at the time of his death, was Secretary and Treasurer of the Thomas Gibson Company, of Cincinnati.

THE proprietors of the Lincoln (Neb.) Gas Company have announced that on and after Jan. 1, 1891, gas for cooking, heating, and power purposes will be sold at the rate of $1.50 per 1,000 cubic feet.

THE 100-horse power Otto gas engine recently installed in the electric department of the Rockville (Conn.) Gas Company is now in duty, and answers every claim that was put forth for it.

MR. STANLEY C. NORTH, formerly Manager of the Schuyler Electric Light Company, of Yonkers, New York, has been appointed General Manager of the Tarrytown and Irvington (N. Y.) Gas Light Company.

THE Lewiston (Me.) Gas Company will soon be obliged to increase its manufacturing plant. Several large factories (notably the Bates Mill) that formerly manufactured their own gas having recently arranged to obtain their supply from the Company.

MR. HORACE WOODMAN, having resigned his position as President and Superintendent of the Saco and Biddeford (Me.) Gas Light Company, has been succeeded by Mr. Charles H. Andrews.

ABOUT a fortnight ago Daniel Fay, a Bridgeport (Conn.) plumber, entered the premises of Zalmon Goodsell with the object of stopping a leaky gas pipe. He carried a lighted torch to aid him in his search. Needless it is to say that the torch found the leak, while Fay gained an experience in that sort of "still hunt" which will last him through life. Whiskers, hair, and eyebrows are gone, and Mr. Goodsell had to hire two masons, two carpenters, and one painter to repair the wreck. Dam age, $700.

THE proprietors of the Athol (Mass.) Gas Company are making repairs on the plant, and candor compels the admission that the scheme was initiated at not too early a day.

THE selling price of gas at Spencer (Mass.) has been raised to $1 per 1,000 cubic feet.

A SLIGHT fire recently occurred in the Hudson street (Jersey City) offices of the United Gas Improvement Company. The damage occasioned was less than $500, which fortunate result can be largely charged to the quickness and expertness of the firemen.

WE are indebted to Mr. Allen R. Foote, Secretary and Treasurer of the National Electric Light Association, for the following particulars respecting the 13th Annual Convention of the Association, to be held in Providence, R. I.:

At a meeting of the Executive Committee, held at the Electric Club, New York city, Nov. 7, the following business was transacted:

1.—The date for holding the Thirteenth Convention was fixed for Feb. 17, 18 and 19, 1891.

2.—Mr. Eugene F. Phillips, of Providence, was appointed Chairman of a committee of five on reception and arrangements; he to appoint the other members of the committee.

3.—General C. H. Barney, of New York, was appointed Chairman of a committee of three on electrical exhibits and transportation; he to appoint the other members of the committee.

4.—The committee on papers reported the following as promised and stated that the prospects of securing two or three more important papers are most excellent. Announcements of these will be made later. The committee has not only secured the promise of these papers, but has gone a step further and named a person to open the discussion on each paper. This must inevitably tend to bring out the best points of the topic, and to greatly add to the interest in and value of the proceedings.

List of Papers.—(*A*) "How Can the National Electric Light Association best Serve Central Station Interests?" by Mr. C. R. Huntley; discussion by Mr. A. M. Young. (*B*) "Distribution of Steam from a Central Station," by Mr. F. H. Prentice; discussion by Mr. Geo. H. Babcock. (*C*) Distribution and Care of Alternating Currents," by Mr. T. Carpenter Smith; discussion by Mr. C. H. Blaxter. (*D*) "Municipal Control of Electric Railroads," by Mr. M. W. Mead; discussion by Mr. M. J. Francisco. (*E*) "The Ferranti System," by Mr. C. B. Haskins; discussion by Mr. C. L. Edgar.

5.—The resignation of Mr. James English as a member of the Executive Committee was accepted, and Mr. Edward A. Leslie, Manager of the Manhattan Electric Light Company, of New York, was elected to fill the vacancy.

THE Councils Committee on Gas of Allegheny, Pa., has endorsed the proposition to abolish the office of Superintendent of Gas (salary $1,200), and to substitute therefor the berth of Superintendent of Public Lighting, the salary to be $2,500 per annum.

THE following notice, from the proprietors of the Middleboro (Mass.) Gas and Electric Light Company, explains itself:

"In order to facilitate the introduction of gas for fuel purposes, the Company has decided to make such change in the nature of its gas as shall fit it for any purpose, either of illumination or heat as may be desired, and thus make it practicable to use the gas stoves, etc., now so extensively uzed in other cities. The Company, therefore, announces that such change will be made on the 1st day of November, 1890, and that a reduction of the price of gas will be made to $2.75 per 1,000 feet, less 5 per cent., if paid within 10 days, to take effect on and after that date. The Company will also furnish free of cost to consumers, now on the mains, burners adapted to the new quality of the gas; and application for these can be made to Mr. Main, Superintendent, at the gas works, who will do all in his power to facilitate the change with the least possible inconvenience to the consumer."

New Patent Law for Mexico.

From *La Propriete Industrielle* we learn the following about the new patent law for Mexico: The patent is only issued to the actual inventor, and there is no examination. At any time during the first year the patentee may obtain a "brevet de perfectionnement" relative to his invention. The original term of 20 years may be prolonged for 5 years additional, by the executive power. The application for the patent is published every 10 days in the official journal for 2 months, and during that period opposition may be made. As concerns novelty, Article 3 states that "an invention or an improvement will not be considered new when it has received, either in Mexico or abroad, and previously to the application for a patent, sufficient publicity to enable it to be put in execution, except in the case where this publication has been made by a foreign authority qualified to issue patents, and in the case where the invention or the improvement has been shown in public exhibition upon Mexican or foreign territory." No period of delay is specified during which the publication resulting from either of these causes must be followed by an application for a Mexican patent.

According to Article 7 the rights conceded by Mexican patents are independent from those resulting from foreign patents. Nevertheless, Article 13 provides that "where they (*i. e.*, patents) are demanded for objects or processes covered by foreign patents, their duration cannot exceed the time yet remaining before the expiration of the first patent delivered to the petitioner." These provisions appear to be contradictory. *La Propriete Industrielle*, however, suggests that they may be harmonized by assuming that the Mexican patent is limited to the normal duration of the first patent granted, but that it is independent of all the accidents that may put an end to this patent. The announcement that Mexico has become associated with the industrial Convention for the protection of industrial property, was incorrect. That country is not yet a member of the union.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks,

16 Wall St., New York City.

November 17.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	96½	96⅝
Central	500,000	50	95	100
" Scrip	220,000	—	95	100
Equitable	4,000,000	100	125	127
" Bonds	1,000,000	—	113	115
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	110	115
Mutual	3,500,000	100	120	—
" Bonds	1,500,000	—	100	102
Municipal, Bonds	750,000		—	—
Northern		50	—	—
" Bonds	150,000	—	—	100
Standard Gas Co—				
Common Stock	5,000,000	100	38	42
Preferred	5,000,000	100	83	87
Yonkers		50	112	—
Richmond Co., S. I.	346,000	50	—	—
" Bonds	20,000	—	—	—
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	120	125
Citizens	1,200,000	20	95	96
" S. F. Bonds	320,000	1000	100	103
Fulton Municipal	3,000,000	100	135	138x
" Bonds	300,000		100	105
Peoples	1,000,000	10	90	93
" Bonds (7's)	368,000	—	100	—
" " (6's)	94,000	—	100	-
Metropolitan	1,000,000	100	108	111
Nassau	1,000,000	25	135	—
" Ctfs	700,000	1000	100	102
Williamsburgh	1,000,000	50	131	133
" Bonds	1,000,000	—	108	112
Out of Town Gas Companies.				
Boston United Gas Co.—				
1st Series S.F. Trust	7,000,000	1000	93	93½
2d " " "	3,000,000	1000	71	72
Bay State Gas Co.—				
Stock	5,000,000	50	55	57
Income Bonds	2,000,000	1000	95½	—
Buffalo Mutual, N. Y.	750,000	100	90	95
" Bonds	200,000	1000	95	100
Citizens, Newark	1,000,000	50	155	160
" " Bonds.	45,000	—	—	-
Chicago Gas Company.	25,000,000	100	37¾	—
Chicago Gas Light. & Coke Co.—				
G't'd Gold Bonds	7,650,000	100	—	86
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1000	—	98
People's Gas and Coke Co., Chicago—				
1st Mortgage	2,100,000	1000	—	100
2d "	2,500,000	1000	94	98½
Consumers Gas Light Co., Jersey City	2,000,000	100	—	30
Bonds	600,000	1000	80	-
Cincinnati G. & C. Co.	6,500,000	100	204	205
Consumers Toronto	1,000,000	50	190	200
Central, S. F., Cal.			80	90
Capital, Sacramento, Cal			58	
Consolidated, Balt.	11,000,000	100	48⅜	48⅝
" Bonds	6,400,000		107	107½
Citizens Gas Lt. Co., Rochester, N. Y.	500,000	—	85	110
Bonds	250,000		—	—
Hartford, Conn	750,000	25	102	108
Jersey City	750,000	20	165	170
Louisville, Ky	2,570,000	50	125	130
Little Falls, N. Y.	50,000	100	—	100
" Bonds	25,000	—	100	103

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As Superintendent of Gas Works,

By a man of excellent charac'er, and who can furnish the best of references. Thoroughly understands the manufacture and distribution of coal and water gas, and the construction of works. 805-3 Address "R.," care this Journal.

Position Wanted

As Superintendent of Gas Works.

Has had a large experience in the manufacture and distribution of gas and construction and extension of gas plants. A1 references. Address

803-tf "E.," care this Journal.

FOR SALE,

The Ironwork for Ten Benches of Fives (5's).

Cast iron Hydraulic Main, 16 by 18 in. Stand Pipes, 5 in. at bottom, 4 in. at top. Bridge and Dip Pipes, 4 in. Address

DAYTON GAS LIGHT AND COKE CO.,

783-tf 130 East Third Street, Dayton, Ohio.

Coal Tar For Sale.

PROPOSALS for the entire make of Tar in the works of the **Pittsburgh Gas Company,** for five (5) years from the 1st day of January next, will be received at their Office, No. 77 Sixth Avenue, Pittsburgh, Pa., until the 13th day of December next, at noon.

Bids to be by the net ton (of 2,000 pounds) of coal carbonized. Tar to be delivered in tar tank at works. Right to use sufficient tar for Company's own purposes, and to reject any or all bids, reserved.

804-6 JOHN H. McELROY, Engineer.

Dissolution of Partnership.

HENRY J. DAVISON & COMPANY.

Notice is hereby given to all interested parties that the co-partnership existing between Henry J. Davison and Frank F. Jones, under the firm name of Henry J. Davison & Company, was dissolved on the 22d day of July, 1890, by the death of the said Davison.

The affairs of the firm will be liquidated by the surviving partner, Frank F. Jones, at his Office, No. 2 Wall Street, N. Y. City, where all claims must be presented on or before Dec. 31, 1890.

DURAND WOODMAN, Ph.D.,

Analytic and Technical

CHEMIST.

Analyses of Coals, Oils, Lubricants. Experimental Investigations for Inventors.

127 Pearl Street (Hanover Square), N. Y.

"SUCCESSFULLY INTRODUCED."

Hill Chemical Company's IRON MASS

For Gas Purification.

Office, 229 Bridge Street. Works, Newtown Creek.

BROOKLYN, N. Y.

CORRESPONDENCE SOLICITED.

The American Gas, Light & Heat Co.,

OF

249 S. 6th St., Phila., Pa.,

Are now prepared to erect plants of their Oxy-Hydrocarbon Process, to carburet coal gas up to any given or named candle power required for general consumption (for instance, from 20 to 25 candles), and at a cost not to exceed one and three-quarters (1¾) cents per candle power per 1,000 cubic feet increased, with a permanent and perfectly *fixed* gas, *not a vapor*—a gas tha will whiten the whole output of the works.

This gas can be furnished at a cost less per 1,000 cubic feet than the coal gas may be costing the company.

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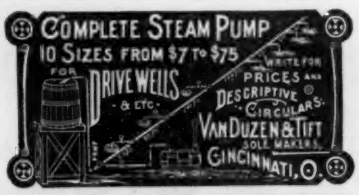
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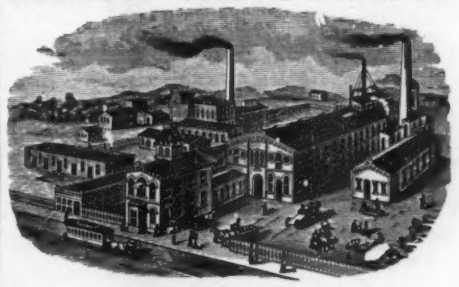

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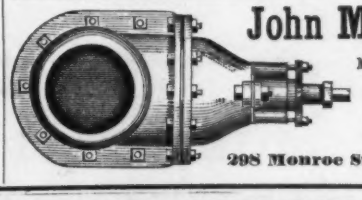

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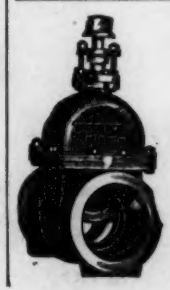

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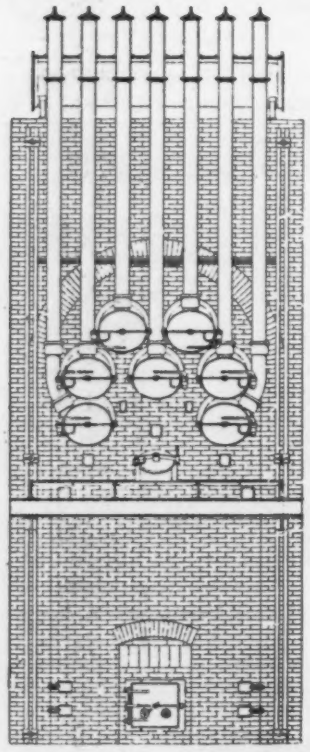

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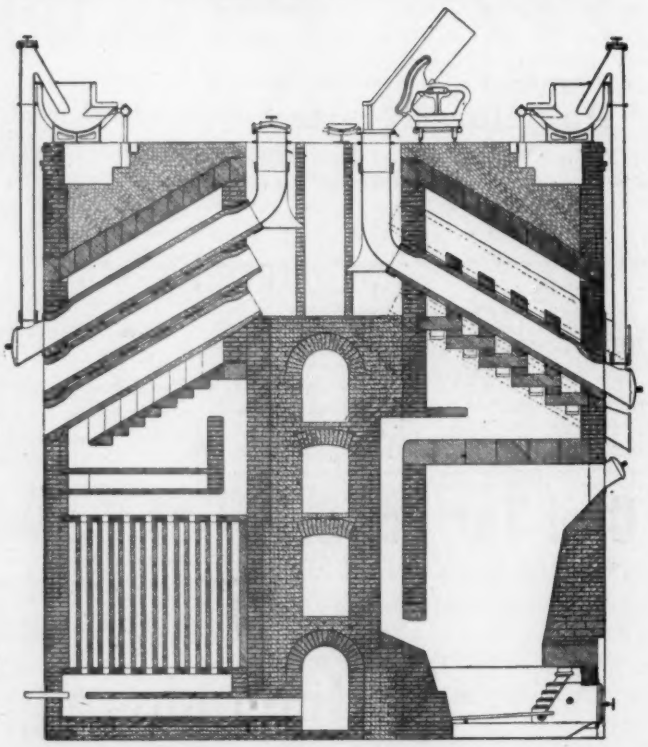

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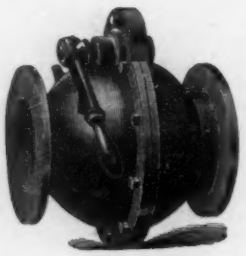

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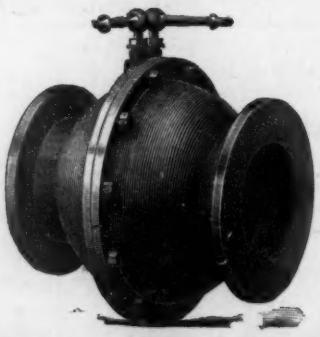

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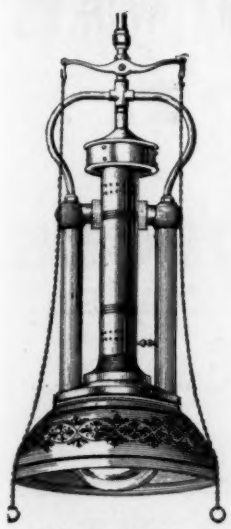
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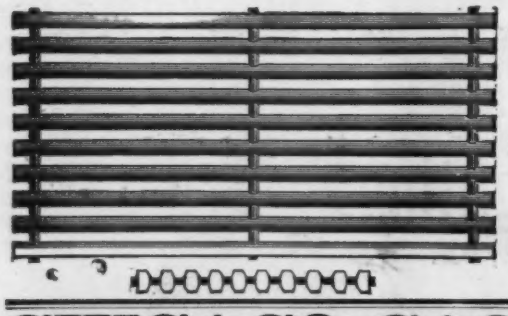

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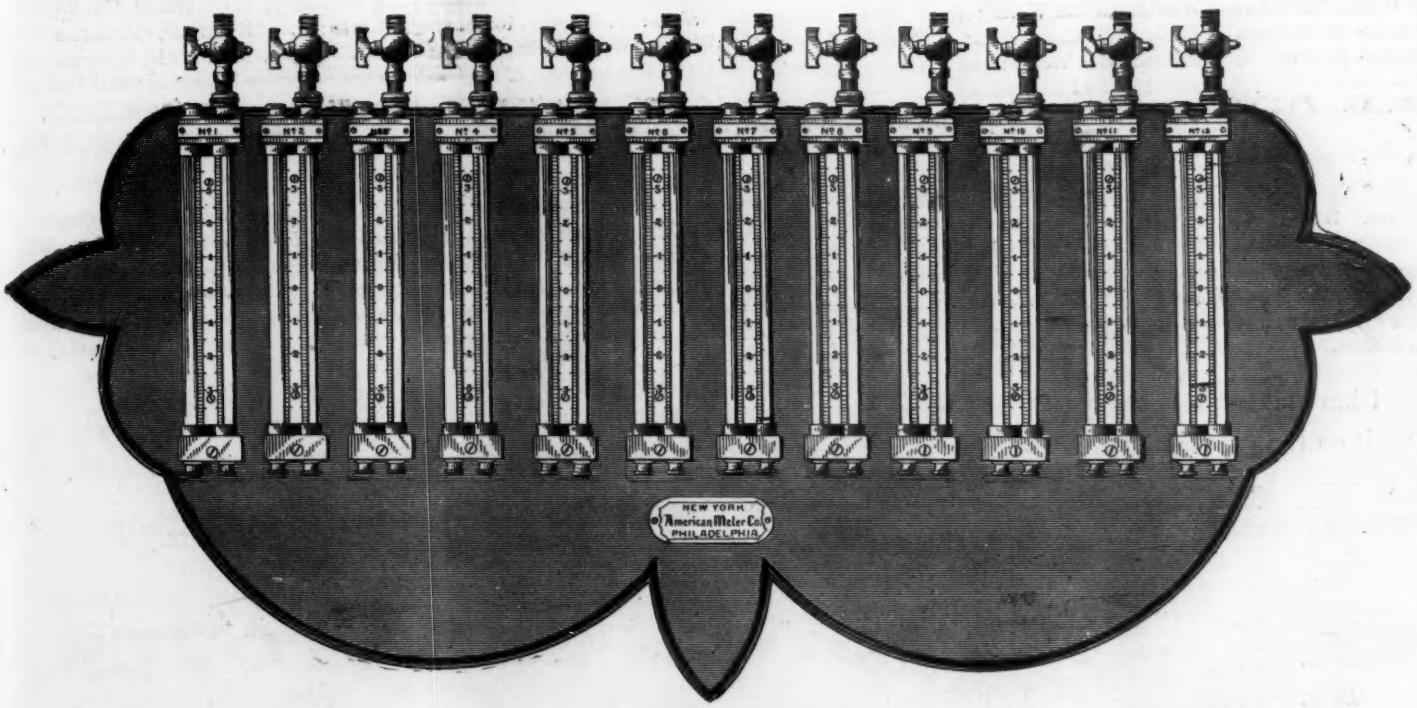

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No. 3,	"	"	250,000	"	"	"	5	"	"	"	"
No. 4,	"	"	500,000	"	"	"	6	"	"	"	"
No. 5,	"	"	750,000	"	"	"	7	"	"	"	
No. 6,	"	"	1,000,000	"	"	"	8	"	"	"	
No. 7,	"	"	1,250,000	"	"	"	9	"	"	"	"
No. 8,	"	"	1,500,000	"	"	"	10	"	"	"	"
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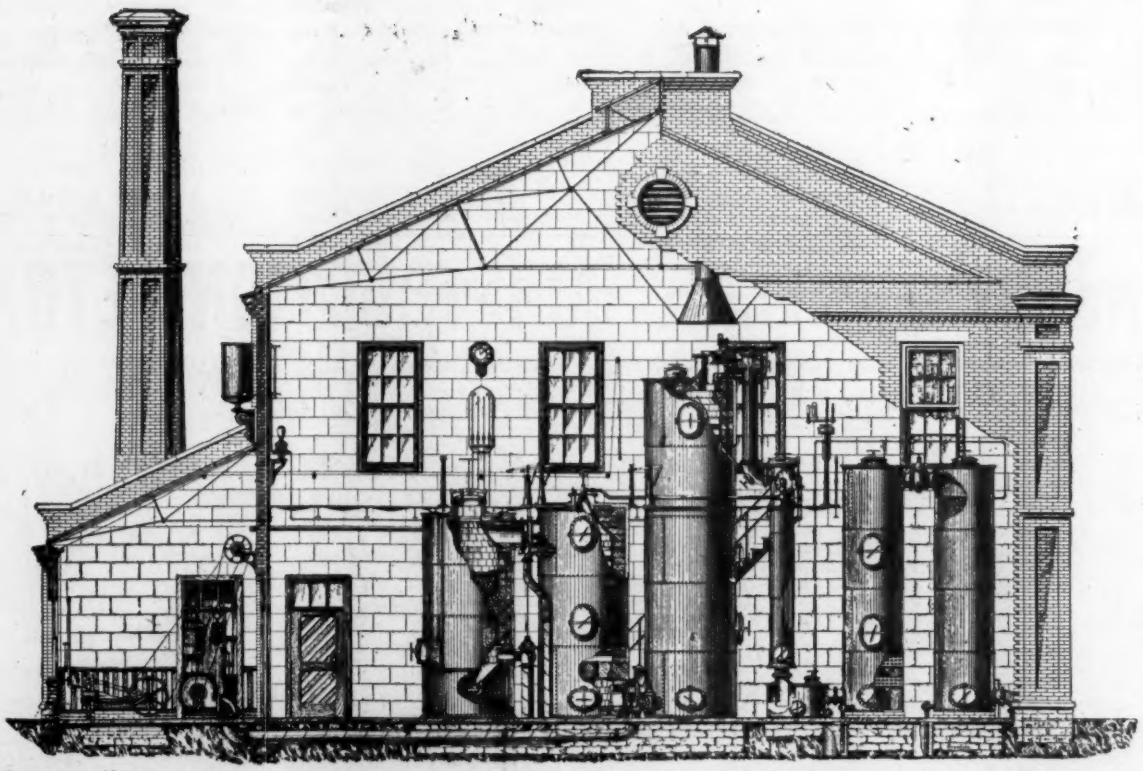

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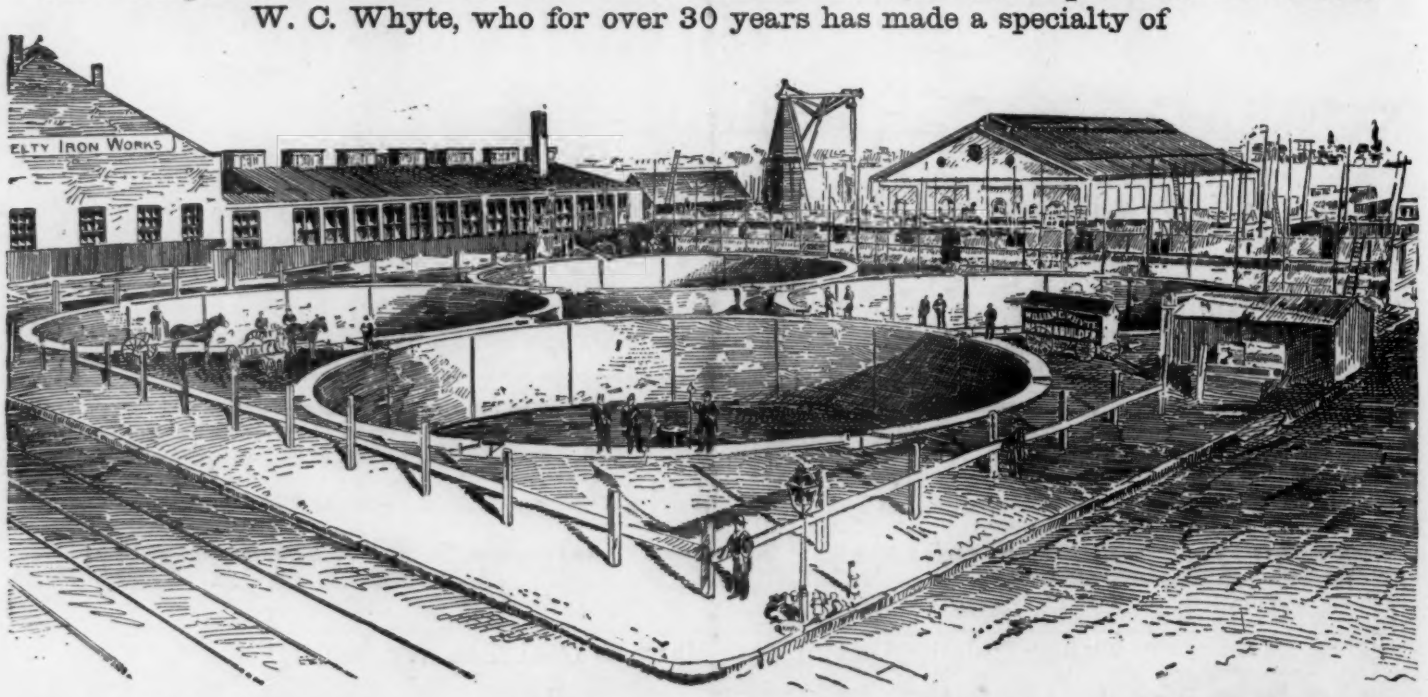

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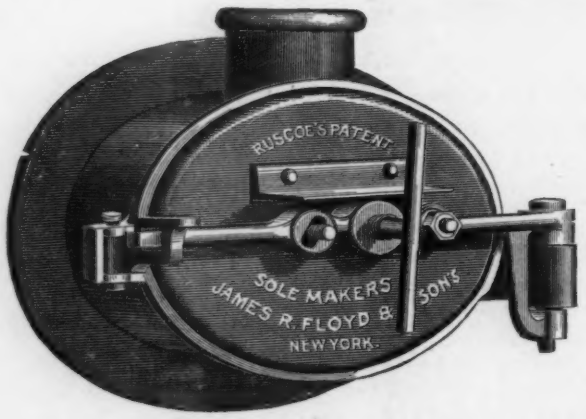

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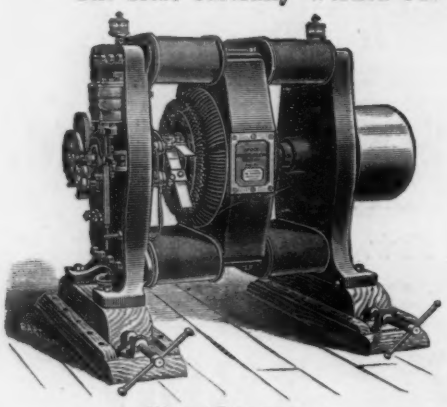

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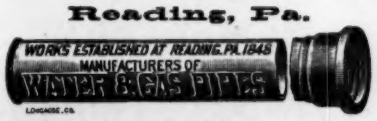

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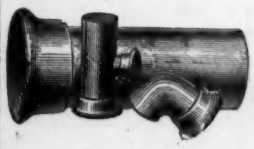

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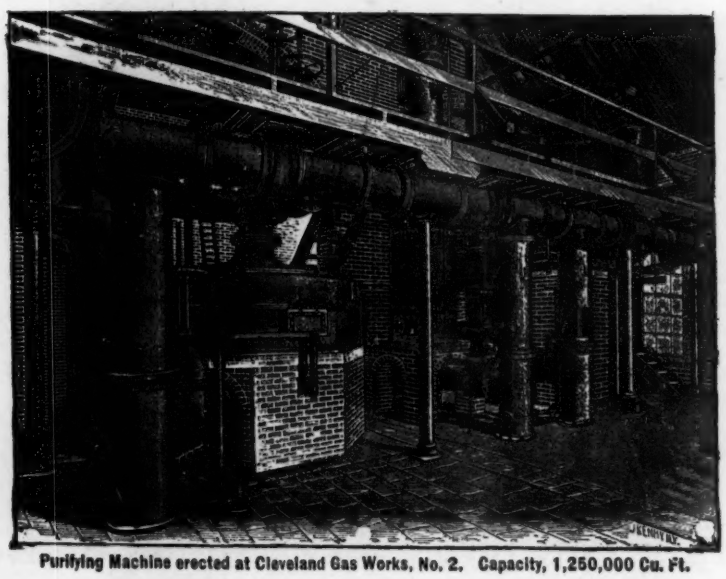

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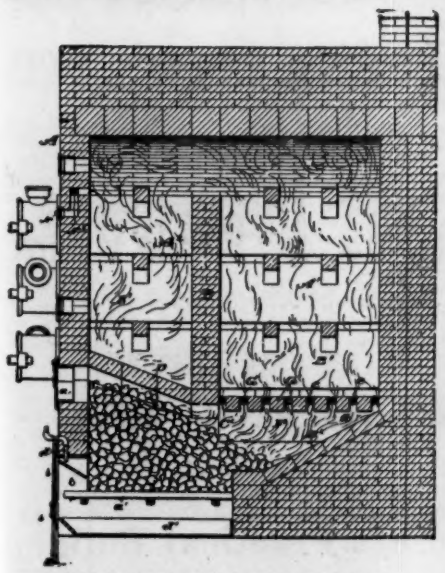

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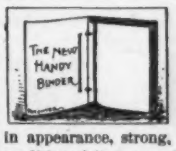

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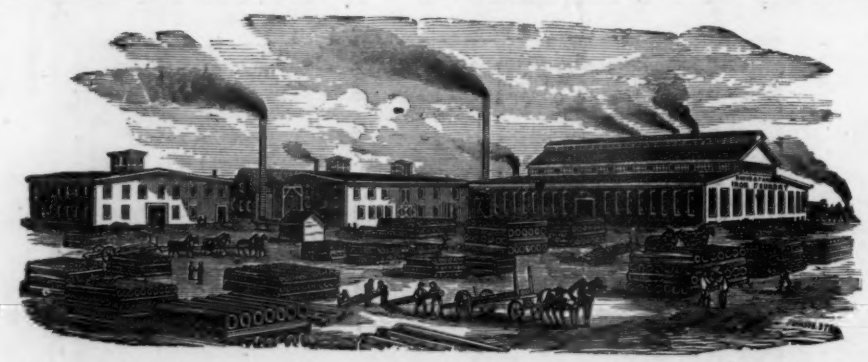

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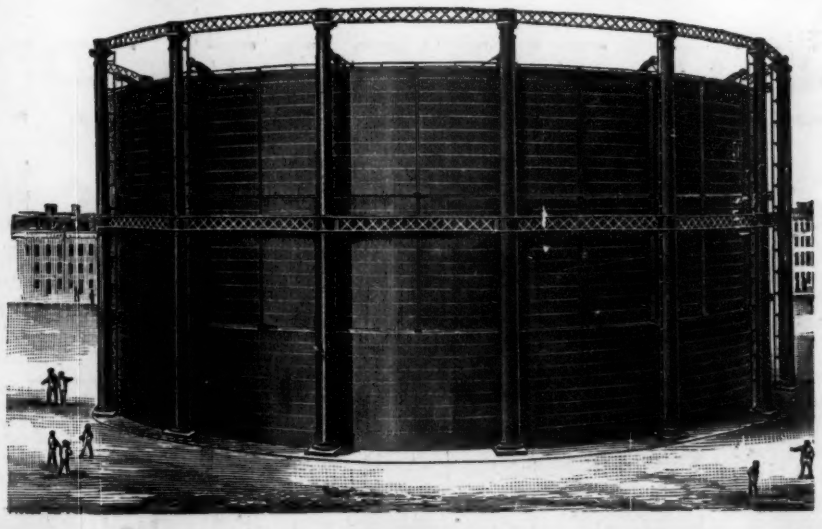

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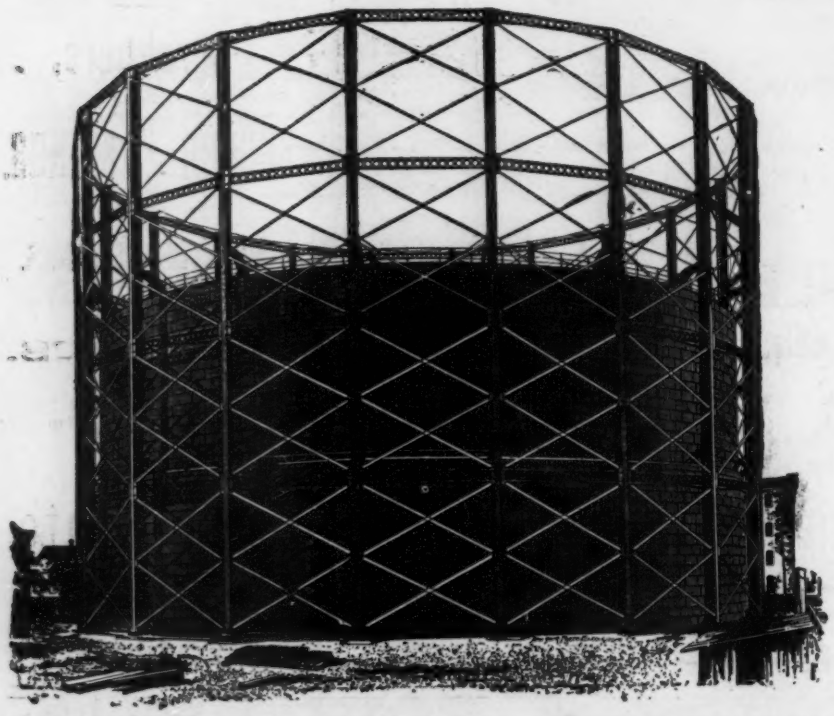

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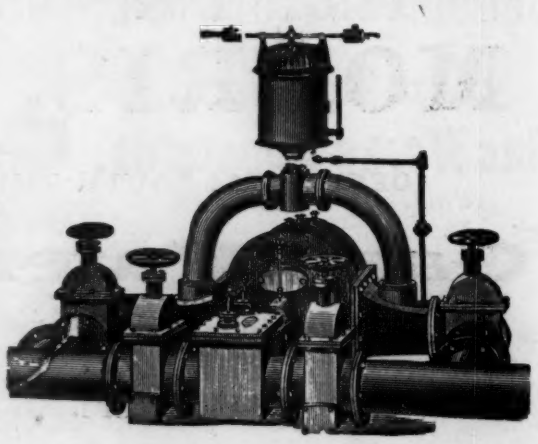

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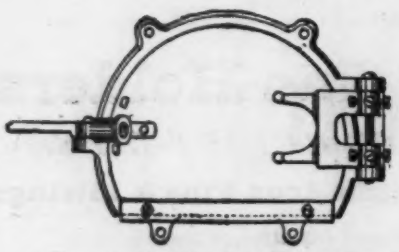

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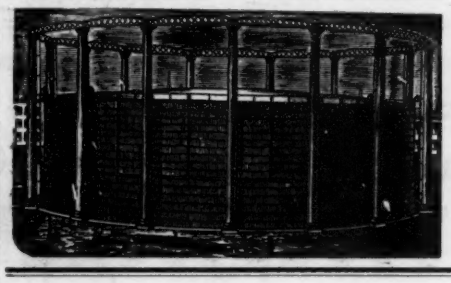

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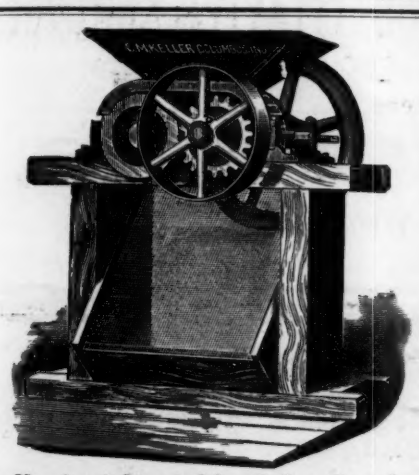

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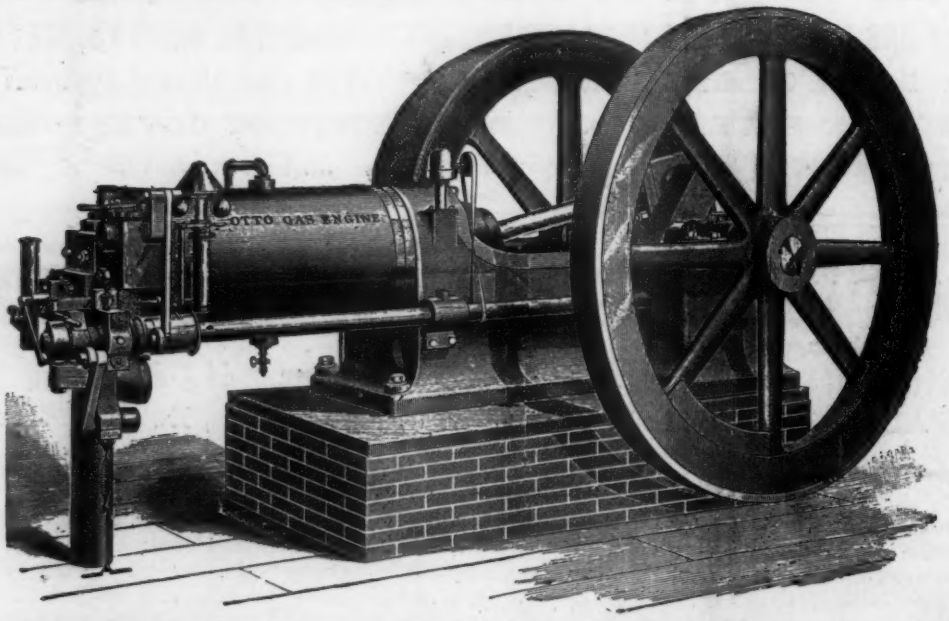

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